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## MARKET STREET DESIGN REPORT

NO. 1  
STRUCTURE AND  
UTILITIES COMPARISONS



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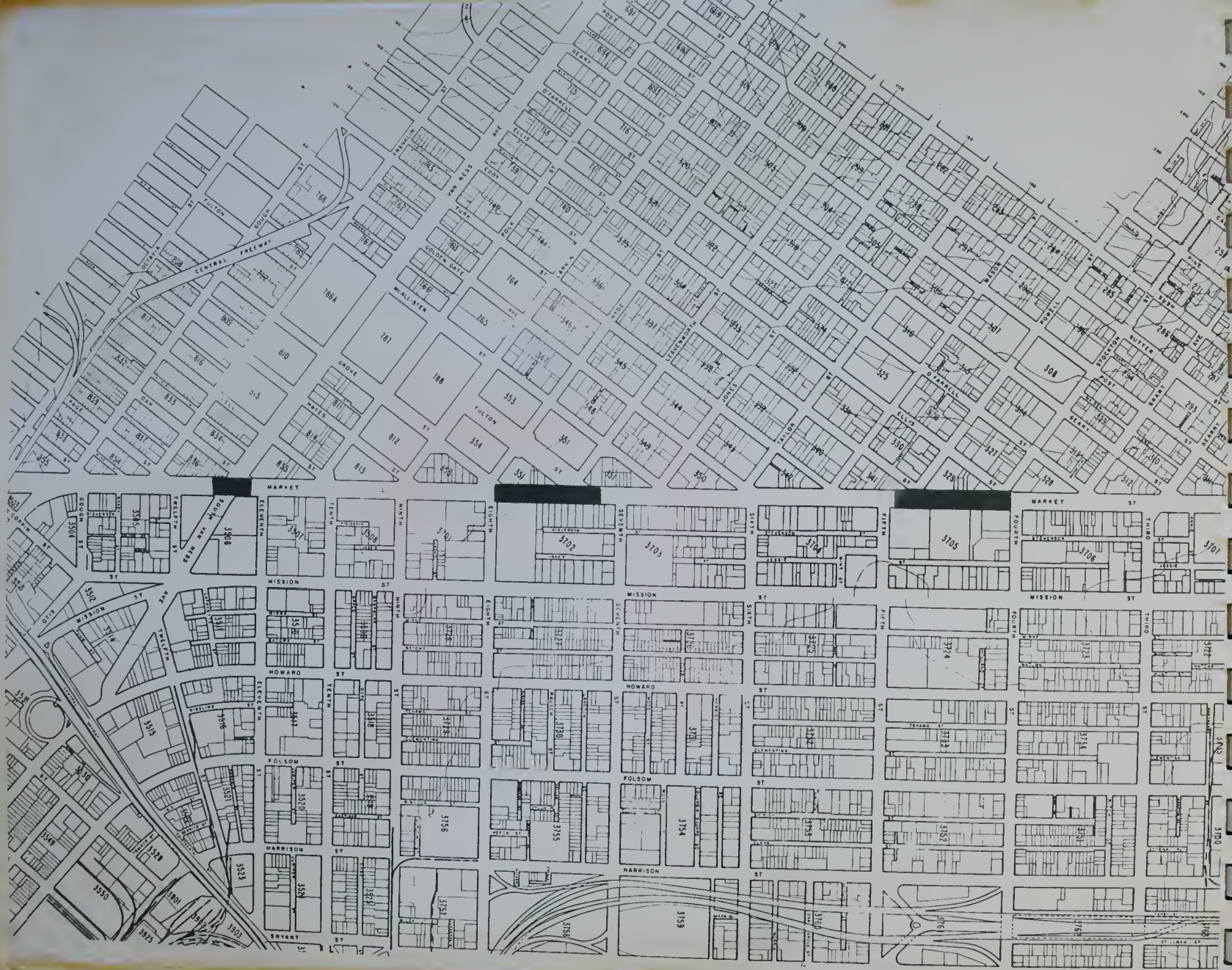
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# MARKET STREET DESIGN REPORT

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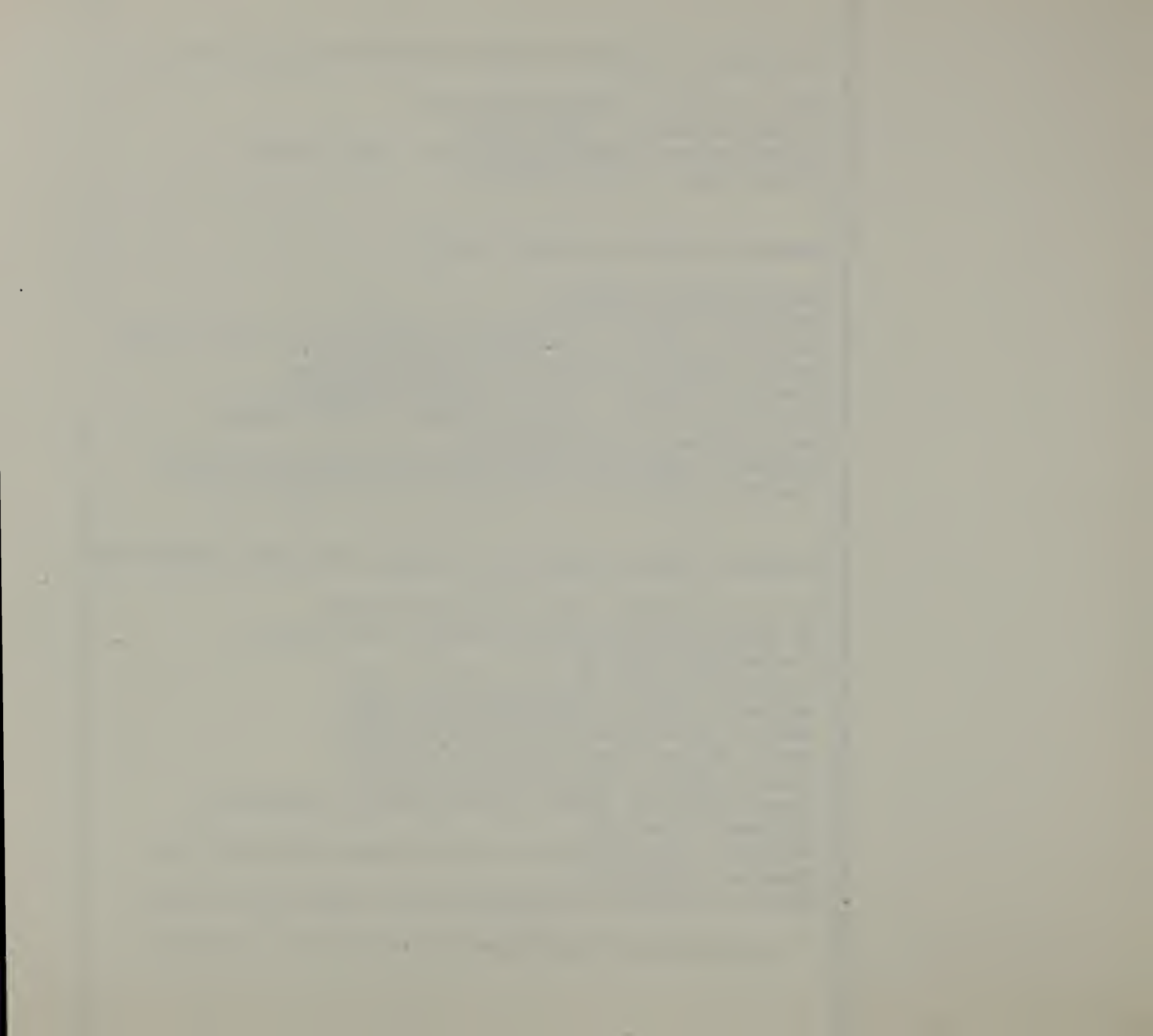
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( front and back cover photographs courtesy of S. F. Examiner)



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## SUMMARY OF FINDINGS

There are three basic methods of handling utilities on Market Street in order to accommodate subway construction. They include:

1. The conventional system of direct burial under the street and above the mezzanine roof.
2. The use of utility tunnels placed below the mezzanine.
3. The use of special utility chases under the sidewalks.

Each of these basic methods has a number of variations that are reflected in the nine different plans evaluated in this report.

Direct burial of utilities in the street has certain advantages where depth of earth above the mezzanine roof is not excessive. In the case of Plan I, this is so great that the mezzanine floor is forced to a low point which seriously limits the future development possibilities for Market Street. Plans 2A and 2B reduce the number of limitations and are worthy of serious consideration.

Utility tunnels under the mezzanine appear to have several serious limitations that include:

1. Construction delays of considerable time.
2. Difficulties of maintenance and service connections for the utilities.
3. Safety hazards in case of a major utility disaster.

For these reasons, Plans 3A and 3B are not recommended.

Utility chases under the sidewalk appear to offer several utility efficiencies and provide a maximum of flexibility in both subway

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construction and street development. They create serious problems of construction scheduling.

A key factor in the feasibility of these plans is the city's ability to move quickly and decisively on the questions of vacating sidewalk vaults and financing of improvements. Plans 4A, 4B, 5A and 5B all have identical utilities configurations, but have dramatically different construction methods and station configurations. In a sense, this demonstrates the flexibility of this particular utilities concept. Because they are identical, the utility configurations in each of the four plans are equally valid. The differing construction methods and station configurations are offered for consideration because of their apparent structural and cost advantages.

The following tables summarize the characteristics of each plan and the estimate of costs for the Montgomery Street station. The cost estimates indicate that both the direct burial plans and the sidewalk utility chases are economically feasible.





## EFFICIENCY OF TRANSPORTATION SYSTEM

## EFFICIENCY OF UTILITIES

## TEMPORARY STREET DISRUPTION

## FUTURE DEVELOPMENT FLEXIBILITY

## SUMMARY

MINIMUM CONSTRUCTION COST  
ABILITY TO MEET BARTD SCHEDULE  
MINIMUM POLICING COST  
EASE OF MOVEMENT STREET TO TRAIN  
EASE OF CONNECTION OTHER TRANSIT LINES  
ACCESSIBILITY OF SUBWAY ENTRANCES  
PLEASANTNESS OF STATION EXPERIENCE  
SAFETY OF MOVEMENT TRAIN TO STREET  
SAFETY FROM CRIMINAL ACTS

UTILITY CONSTRUCTION COST  
MINIMUM COST & EASE OF MAINTENANCE  
MAXIMUM SAFETY FROM HAZARDS  
EASE OF SERVICE CONNECTIONS  
EASE OF NORTH-SOUTH CROSSOVERS

MINIMUM LENGTH OF CONSTRUCTION PERIOD  
MINIMUM CURTAINMENT STREET USE  
MINIMUM CURTAINMENT SIDEWALK USE  
MAXIMUM SAFETY GENERAL PUBLIC  
MAXIMUM SAFETY ADJACENT STRUCTURES  
MINIMUM POTENTIAL DISRUPTION OF UTILITIES

POSSIBLE CONNECTIONS TO ADJACENT PROPERTY  
POSSIBLE SUBSURFACE STREET CROSSOVERS  
POSSIBILITY OF INTERCONNECTING PLAZAS & CONCOURSES  
FLEXIBILITY OF TRAFFIC WAY  
FLEXIBILITY OF SIDEWALK  
FLEXIBILITY OF LANDSCAPING  
POSSIBILITY OF OPENINGS FOR LIGHT & AIR

SCHEME #1

⑨ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

② ○ ○ ○ ● ○

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

○ ○ ○ ● ○ ○ ○ ● ○ ○

Scheme is high in total cost and seriously limits development flexibility

SCHEME #2A

⑥ ○ ○ ○ ○ ○ ○ ● ○ ○ ○

① ○ ○ ○ ● ○

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

○ ○ ○ ● ○ ○ ○ ● ○ ○

Both schemes have a minimum of problems but are only adequate in most respects

2B

⑥ ○ ○ ○ ○ ○ ○ ● ○ ○ ○

③ ○ ○ ○ ○ ○

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

○ ○ ○ ● ○ ○ ○ ● ○ ○

SCHEME #3A

④ ○ ○ ○ ○ ○ ○ ● ○ ○ ○

④ ○ ○ ○ ○ ○

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

● ● ● ● ○ ○ ○ ● ○ ○

High in cost, scheme has serious utility inefficiencies

3B

⑧ ○ ○ ○ ○ ○ ○ ● ○ ○ ○

⑨ ○ ○ ○ ○ ○

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

● ● ● ● ○ ○ ○ ● ○ ○

Low in cost but scheme has serious utility inefficiencies

SCHEME #4A

④ ○ ○ ○ ○ ○ ○ ● ○ ○ ○

⑤ ● ○ ● ○ ○

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

● ● ● ● ○ ○ ○ ● ○ ○

Scheme is low in cost and has many advantages of utility service and future flexibility

4B

③ ○ ○ ○ ○ ○ ○ ● ○ ○ ○

⑤ ● ○ ● ○ ○

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

● ● ● ● ○ ○ ○ ● ○ ○

Lowest cost mezzanine plan is a radical departure in construction methods.

SCHEME #5A

② ○ ● ● ○ ○ ○ ● ● ○

⑤ ● ○ ● ○ ○

● ○ ○ ○ ○ ○ ● ○ ○ ○

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

Very low in cost, scheme has many transit efficiencies but serious problem of utility crossing

5B

① ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

⑤ ● ○ ● ○ ○

● ○ ○ ○ ○ ○ ● ○ ○ ○

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

cheapest in cost, this scheme has serious transit inefficiencies

KEY: ● GOOD

○ ADEQUATE

○ POOR



COMPARATIVE COSTS OF MONTGOMERY STREET STATION  
PLANS 1 THROUGH 4A

4

Plan 1	Utilities	\$ 1,990,000
	Station	8,500,000
	Underpinning	<u>1,180,000</u>
		\$11,670,000
Plan 2A	Utilities	\$ 1,883,000
	Station	8,400,000
	Underpinning	<u>1,001,000</u>
		\$11,284,000
Plan 2B	Utilities	\$ 1,998,000
	Station	8,850,000
	Underpinning	<u>1,001,000</u>
		\$11,849,000
Plan 3A	Utilities	\$ 2,014,500
	Utility tunnel	1,093,500
	Station	8,800,000
	Underpinning	<u>1,001,000</u>
		\$12,909,000
Plan 3B	Utilities	\$ 2,316,000
	Utility crossover	13,500
	Station	8,850,000
	Underpinning	<u>1,001,000</u>
		\$12,180,000
Plan 4A	Utilities	\$ 2,273,000
	Utility chases	900,000
	Station	8,800,000
	Underpinning	<u>1,001,000</u>
		\$12,974,000





PERTINENT STATEMENTS ABOUT MARKET STREET

Dan Jacobson - excerpt from No Further West (p. 62) :: 1962

"Market Street (San Francisco) particularly stands out in my mind as one of the ugliest streets I have ever seen. So besmeared with signs over its buildings that there was nothing for the eye to do but dart from place to place in a vain search for a resting place."

Mayor Shelley :: July 29, 1964

"Market Street is about to undergo changes which involve many millions of dollars of public and private investment. Our energies must be harnessed to achieve the maximum benefit to San Francisco from these investments. We need settle for nothing less than greatness --- the creation of a great thoroughfare."

Mayor Shelley :: July 10, 1964

"Why cannot we have a great Market Street; a magnificent place as beautiful as our hills and our bay, a place people will come from all over the world to see?"



San Francisco Board of Supervisors' Resolution    ::  
February 15, 1965

"Market Street should be redesigned so that it will emerge ... not only as one of the world's great shopping streets but also one of the world's most attractive. To make the subway stations as attractive as possible, and to encourage their use, the station mezzanines or concourses should be built as short a distance under the street as possible, and every effort should be made to link such concourses with the existing basement floors of buildings along Market Street."

San Francisco Board of Supervisors' Resolution    ::  
March 1963

"... Maintaining the economic vitality of Market Street and the commercial district to north of it depends upon the development of north-south routes ..."

Mortimer Fleishhacker, Jr., President of SPUR    ::  
February 26, 1965

"... press vigorously for making Market Street one of the world's great thoroughfares."





General James W. Coutts, General Manager, Retail and Dry  
Goods Association of San Francisco :: September 17, 1964

"I will quote you one of the answers to the question - What is the function of Market Street ? It came from one of the retailers and is not my wording. I probably would have done it a little differently but I thought it would be better if you got this description directly from one of the members of the stores."

"Market Street should be the main artery of our downtown. It should consist of high quality and medium quality stores, and should be a main draw for entertainment, commercial and service facilities. There should be a strict architectural control over design, signing, and landscaping of stores so that a charming character can be established and maintained. Upper-most consideration should be given to cleanliness of the area and all public facilities such as light standards, news stands, trash cans, etc., should be attractively designed. Only if San Franciscans and visitors know that good stores, selling fine assortments are on Market Street will this again become the great retail street of the past. "

General James W. Coutts, General Manager, Retail and Dry  
Goods Association of San Francisco :: July 10, 1964

"These organizations for which I speak offer every assistance that we are capable of giving to bring about the early and orderly completion of modifications on Market Street that will make it a more prosperous and beautiful central artery for San Francisco. "



Market Street Development Project Steering Committee, What to  
do about Market Street :: December 11, 1962

On June 6, 1962, several leading businessmen and property owners on Market Street met with officers of the San Francisco Planning and Urban Renewal Association to discuss the future of Market Street - San Francisco's main thoroughfare. The meeting ended with agreement on three objectives: to transform Market Street into one of the world's most attractive boulevards; to rid Market Street of its shabby atmosphere; and to put new life into Market Street as a center of Bay Area business, shopping, and entertainment. It was further agreed that a program or plan of action was needed.

Mayor Christopher :: July 25, 1961

"One urgently needed action program concerns the revitalization of Market Street, a unique geographical, physical and economic focal point of our City; with the Ferry Building, new Ferry Park, and the Golden Gateway project at one end and the Civic Center at the other. There is excellent potential for transposing this physically rather shoddy commercial street into the major cultural and business artery that it should be --- the symbol of a great city."

Mayor Christopher :: July 2, 1961

"A handsome vital boulevard must be created to replace the deteriorating conditions that inevitable set in wherever there is no concerted plan of carefully planned rehabilitation."



## PURPOSE OF REPORT

The present schedule for subway construction on Market Street by the Bay Area Rapid Transit District in downtown San Francisco calls for the start of actual digging in January 1966. The City and County of San Francisco are required to make numerous immediate policy decisions which will affect both the subway construction plans and processes and the future of the Street after the construction has been completed. The consultants have been retained to help the responsible officials and the citizens of the city to define the choices available in the decisions that must be made, so that the ultimate plan will be as successful as possible. The consultants will do this through as comprehensive a study of their own as time permits, as well as through a review of earlier studies.

This report is intended to aid the City and County of San Francisco in making those decisions BARTD requires of it by March 15, 1965, specifically with reference to the construction of subway stations and location of utilities. It will be one of a continuing series of reports geared both to the decision-making needs of the City and to the continuing work program considering the entire picture of Market Street as it relates to the City. Themes only briefly touched on here will be developed later in recommending firm policies concerning other aspects of the subway construction and the City's program for Market Street reconstruction.

The basic subject of utilities and structural comparisons will color many other areas of concern with the Street. While there may be some initial insight as to the implication of structure and utilities on these other considerations, this report will only be able to indicate the range of design possibilities which are allowable within a particular construction configuration.

Listed below are the decisions which the Bay Area Rapid Transit District has asked the city to make and the dates on which these decisions should be forthcoming in order to maintain BARTD's





original design and construction schedule. Shown is the most recent schedule of critical deadlines established by BARTD on February 26, 1965.

March 15, 1965

1. Alternative utility relocation  
Location scheme if City desires such
2. Utility relocation plans
  - a. Critical major work
  - b. General work - as required between now and August
3. Municipal railway operations - critical now
  - a. Use of street cars
  - b. Streetcar clearances
  - c. Platform needs
  - d. Acceptance of either reversed orientation of operations or addition of left-hand side loading
4. Municipal railway operations
  - a. Transfer concept flow
  - b. General concurrence on policy
5. Vent shaft grating locations - General concurrence on policy

April 1, 1965

1. Municipal railway operations
  - a. Choice under 3.d. above
  - b. Fare collections facility arrangement
2. Street surface development - Station entrance general location concurrence



May 1, 1965

1. Municipal railway operations
  - a. Use of present substations or betterment
  - b. Use of signalling system
2. Vent shaft grating locations - Specific final plan
3. Master Agreement - Maintenance of Traffic Plan

June 1, 1965

1. Public plaza entrances to stations

July 1, 1965

1. Street surface development
  - a. Final changes in entrances
  - b. Street usage master plan
2. Private off-street entrances to stations
3. Master agreement - Draft of other articles - July 1, 1965 to August 1, 1965.



The investigation was designed to determine the engineering feasibility, comparative costs and design implications of the relocation of utilities in Market Street that would be required as a result of the construction of stations for the Market Street Subway. Alternative plans of station complexes prepared by the Bay Area Rapid Transit District and the Market Street Task Force were the elements to be studied. Several additional alternatives became apparent during the course of the investigation.

The report consists of an evaluation of nine variations of three basic schemes of utility location. The analysis contains the following elements:

1. The engineering feasibility of each alternative plan.
2. The costs for relocation of utilities under all plans utilizing data furnished by the utilitied companies.
3. The consultants preliminary estimate of station construction costs for each plan.
4. A comparative cost analysis of the various alternatives.
5. A time schedule for design and construction of relocated utilities, and an analysis of how this would affect total construction time.

Method. In view of the limited time available for the investigation, the basic approach was to select one station for detailed analysis. The Montgomery Street station was selected as being representative of average conditions on Market Street. Construction problems and costs at this location were analyzed. The specific problems of each utility were considered.

As a first step, all of the available technical information about





subway construction on Market Street was reviewed. Next, a questionnaire was distributed to the utilities companies. The cost to relocate or support existing utilities in place, the incremental cost to increase the size of relocated utilities to that required for future capacity and a time schedule for the required design and construction was requested. Plans of three of the original alternatives were included in the questionnaire. Personal visits, meetings and conferences were scheduled with each company to amplify the information.

Basic utility cost estimates were prepared by the utility companies during the past month. These were evaluated and integrated into a common cost framework by the consultants. The cost estimates are based on the consideration that utilities will be relocated or replaced in comparable capacity to existing facilities. Estimates of subway construction costs are based on conventional procedures for this type of work. A statement of assumption concerning construction method is included in the analysis.

A set of criteria for evaluating each plan in terms of its efficiencies and design implications was developed. The plans were evaluated on the basis of the stated criteria.

The estimates shown in this report are preliminary in nature and are intended to show the comparative magnitude of the costs involved. These are not to be construed as firm prices for the work, since final plans have not been prepared nor have commitments been made for utility relocations or construction methods.



The physical design objectives for construction of a subway system on Market Street would normally be derived from a more comprehensive plan for the development of all aspects of the Street. The design of the subway should be specifically directed to, and evaluated in, terms of a total plan. In the absence of such a plan, the task of developing design objectives for the subway system is more difficult.

It is clear that one of the prime objectives must be to develop the best possible transportation system. But in order to make the system serve the Street, it must be planned within the larger framework of existing conditions and future development. Since the future of the Street --- its surface treatment and its activities --- are as yet undetermined, subway construction must allow maximum flexibility of future design and development.

The specific objectives for design of the subway can be listed in the following way:

1. To provide the most efficient transportation system. This would include construction and operating costs for the system and maximum rider convenience and safety.
2. To provide the most efficient system of utility service. An efficient system of utilities in terms of cost, ease of maintenance and consumer service must be provided.
3. To cause minimum disruption of essential Market Street activities during the construction of the subway. Services must be maintained and business must continue on the street during the construction period.
4. To provide maximum flexibility of future design and development of the Street. The location of entrances, the depth of



mezzanines, the location of ticketing functions and the shape and character of the stations will all have a limiting effect on the treatment of the street surface and development of adjacent properties. In the absence of a definitive plan for these things, the subway design that provides maximum future flexibility becomes highly desirable.

## EVALUATION CRITERIA

To evaluate the various design proposals in terms of these objectives, it is necessary to state the objectives in more specific terms. The following list of specific criteria has been drawn up for this purpose. The criteria are intended as a checklist in support of the more general design objectives and should be useful in evaluating the subway design proposals.

1. Efficiency of transportation system:
  - a. Minimum construction cost of system.
  - b. Minimum policing costs of stations.
  - c. Ease and quickness of travel from street to train.
  - d. Ease of reaching subway entrances from adjacent properties and streets.
  - e. Ease of connections to other transit lines.
  - f. Pleasantness -- visual and atmospheric of the subway experience.
  - g. Safety of movement from trains to street surface.
  - h. Safety from criminal acts in subsurface areas.
2. Efficiency of utilities:
  - a. Minimum utility construction cost.
  - b. Ease, minimum cost and minimum disruption of utility maintenance.
  - c. Maximum safety in case of break, explosion or earthquakes.
  - d. Ease and minimum cost of service connections.
  - e. Ease of north-south utility crossovers.





3. Disruption of activities during construction:
  - a. Minimum length of construction period.
  - b. Minimum disruption of street surface during construction.
  - c. Minimum disruption of sidewalk during construction.
  - d. Maximum safety for the general public
  - e. Maximum safety for adjacent structures.
  - f. Minimum possibility of utility service disruption during construction.
  
4. Maximum development flexibility:
  - a. Possibility of connections to adjacent properties.
  - b. Possibility of subsurface street crossovers.
  - c. Possibility of interconnecting concourses and plazas.
  - d. Maximum flexibility of traffic way width.
  - e. Maximum flexibility of sidewalk width and design.
  - f. Maximum flexibility of landscaping.
  - g. Possibility of openings to light and air.



ACTIONS REQUIRED BY THE CITY IF UTILITY RELOCATION  
SCHEMES ARE CHOSEN

Schemes 4 A, 4 B, 5 A and 5 B cannot be executed without major off-street utility relocations. If the City wishes to choose any of the above schemes, it must act in the following ways:

1. The City must determine by April 15, 1965, that the trunk lines of P. T. & T. telephone, the high pressure water and the 22" low pressure water will be relocated off of Market Street.
2. By no later than May 1, 1965, the Board of Supervisors must pass a resolution revoking permission to use sub-sidewalk basement space on Market Street within the station areas. The resolution must require vacation of the space within three months.
3. The City must be prepared to expedite all matters relating to vacating the basement space and construction of the utility chases. This would include expediting building permits for property owners and giving these owners all possible assistance on the dislocation.
4. The City must instruct the City Attorney's office to act immediately, if after three months, all sub-sidewalk space has not been vacated.

If the City is unwilling to undertake any of these actions, then the consultants would deem it inadvisable to choose any of the plans indicated.



## ANALYSIS OF THE PLANS

On the following pages, each of the alternative plans is examined in detail. There are in addition some overall considerations that apply equally to all of the plans.

### Construction Methods

In order to analyze costs and construction schedules, it was necessary to assume a particular method of construction. The procedure described below is a conventional and entirely feasible method of subway construction. It is entirely possible that the contractor might devise faster or less expensive methods but this cannot be predicted in advance.

1. It is assumed that all stations will be built by a cut and fill method.
2. The area to be excavated will be dewatered as construction progresses. The dewatering procedure is described separately.
3. Parallel to the station or subway and on each side of the subway the soil will be supported by placing lagging or sheet piling or by other methods before excavation proceeds.
4. Steel beams and wood decking will be used to temporarily replace street paving and to support the municipal railroad unless the railroad is temporarily relocated. Steel beams are usually placed across the area to be excavated. Steel beams are then placed parallel to and under the railroad ties. Between these a temporary wood decking is placed to the effect that, except where the contractors are immediately working, the entire surface of the street is operational.





5. If the utilities are left in the street, most of them will be temporarily supported by hanging them from the beams described above.
6. Between stations, tunneling will probably be done by shield and breasting method. The tunnel would probably be dewatered, although the lower tunnel might be constructed using compressed air.

#### Maintenance of Service on Market Street during Subway Construction

Present street cars could be supported on steel beams so that service need not be interrupted. Maintenance of street car service has been assumed for the purpose of this investigation. It would however, facilitate construction time and be more economical if passengers on the street cars could be transferred to buses.

Bus and automobile can be maintained by opening only a part of the street at one time. A temporary wood deck is then placed over the excavation. This has been assumed under all plans. Disruption of the street surface is an important factor in any scheme, but the relatively short period of disruption during construction must be weighed against the unique opportunity for long-term benefits to the entire city.



Pedestrian traffic interruption depends on the method of utility relocation as follows:

1. For schemes 1, 2A, 2B, 3A and 3B. If the utilities are left in roadway areas, in ground or boxes, there would be practically no interruption of pedestrian traffic.
2. In schemes 4A, 4B, 5A and 5B. If utilities are placed in utility boxes under the sidewalks, pedestrian traffic would be partially interrupted for the time required to build the boxes and place utilities. A small pedestrian walkway could be maintained adjacent to and parallel to the utility runway or box with temporary wood deck crossovers to all building entrances.

#### Dewatering and Underpinning

Subway construction in the sand and soft soils that we have below Market Street will require underpinning of many adjacent buildings.

For each type of soil, investigations correlated with the type of building, foundation depth and foundation loads will be required to properly determine whether underpinning is required. In addition, the amount of dewatering required, and system used, will affect the underpinning requirements.

There has been some discussion that the water from dewatering operations could be pumped back into the sands behind the sheet piling. This will probably make heavy sheet piling a requirement and further will increase the loads on the side of the bulkheading and the cost of bulkheading. Sheet pile driving on Market Street would be difficult due to the existing utilities and for that reason a "soldier pile" and lagging scheme will probably be used. If lagging is used it will not be possible to pump the water back into sand behind the lagging.



The depth of water below Market Street varies from 10 to 30 feet. An average depth of 20 feet would make it necessary to dewater all schemes.

In the fine sand area along Market Street, dewatering could cause settlements in buildings to a considerable width perpendicular to the street, unless there is adequate underpinning. Additional settlement due to deflection of the bulkheading could occur. These settlements are usually of greater magnitude than the dewatering settlements, but do not affect as great an area.

#### Need to Relocate Utilities

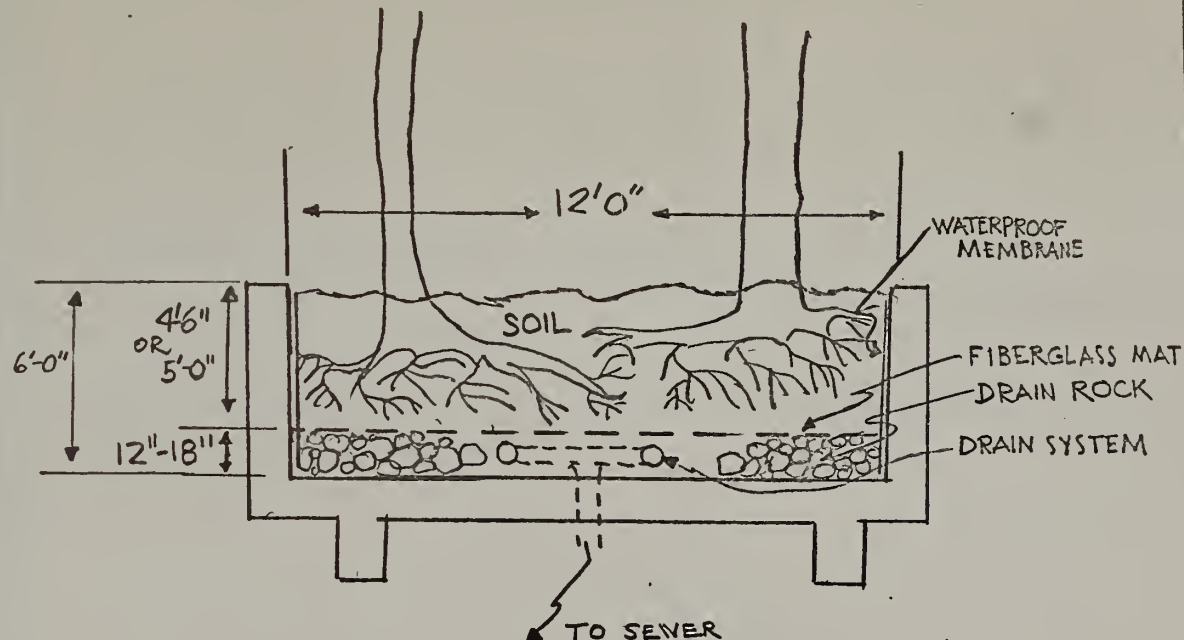
BARTD's responsibility in regard to utilities is simply to keep them in service during construction and to restore the system to its existing condition at the completion of construction. The city's obligation and interests are to maintain the best possible utility systems. Subway construction on Market Street gives the city a great opportunity to plan for the future and make utility improvements that will be of benefit for many years. These improvements can be obtained at bargain prices during this period of subway construction.

#### Urban Design Considerations

Each of the plans for utility location will influence design and development possibilities on the Street. In order for Market Street to become the great street that everyone desires, there must be flexibility in future design. Maximum potential for mezzanine connections to plazas, concourses or adjacent buildings is an important issue. The possibility for street landscaping is also important and has special requirements. The technical requirements for a planting strip on the street surface







DETAIL OF CONTINUOUS PLANTING STRIP

The tree planting strip bed depth should allow for an adequate drainage system as well as some new soil between the root ball and the drain rock. A minimum working depth of six feet should be allowed to accommodate all the necessary requirements for good tree growth and vigor. Any working depths less than six feet will neither allow for soil beneath the root ball nor an adequate drainage system depth.



are shown on the accompanying drawing. Provisions for this kind of installation are important to every plan.

It is essential that the decisions on utilities locations include serious consideration of all these factors.

#### Key to Utility Identification

The utility numbers used in drawings of the various schemes are identified in the following key.



These systems contemplate retention of the existing facilities in an undisturbed strata above the subway station. Altho a particular section across Market Street was selected for the purpose of illustration it is not to be construed that this section is typical of the utility arrangement throughout the construction sites, but rather illustrative of the general arrangement between street intersections. At street intersections the arrangement becomes so complex as to make a general analysis impracticable.

<u>Symbol</u>	<u>System</u>	<u>Utility Company</u>	<u>Description</u>
1	Electric power	Pacific Gas and Electric Co.	7 multiduct conduits
2	Gas mains	Pacific Gas and Electric Co.	1-8" HP pipe 1-16" LP main 1-8" HP main
3	Steam main	Pacific Gas and Electric Co.	1-12" pipe
4	Water main	San Francisco Water Department	1-8" LP main 1-22" LP main
5	Auxiliary water	San Francisco Department of Public Works	1-18" pipe
6	Communication	Pacific Telephone & Telegraph Co.	One 4-3" duct envelope and 1-2" iron conduit





<u>Symbol</u>	<u>System</u>	<u>Utility Company</u>	<u>Description</u>
7	Communication	Western Union	One 18-3" wood duct envelope and one 4-3" tile duct envelope
8	Police, Fire & Traffic signal system	San Francisco Department of Electricity	3-3" iron pipe conduits
9	Sewers	San Francisco Department of Public Works	3'x5' brick sewer 4'x8' brick sewer
10	Communication	Municipal Railway	One 12-3" duct envelope



This scheme incorporates an independently constructed utility tunnel under the vaults for inclusion of all utilities presently located in Market Street with connections made to the existing conductors at either end of the station. It is presumed that the size of all service utilities shall be unchanged from those shown in all schemes other than 1 and 2A and that these shall be located on each side of the street with larger trunk lines located on but one side of the street.

<u>Symbol</u>	<u>System</u>	<u>Utility Company</u>	<u>Description</u>
1	Electric power	Pacific Gas and Electric Co.	1-18" multiduct
2	Gas main	Pacific Gas and Electric Co.	1-12" LP pipe 1-8" HP pipe*
3	Steam main	Pacific Gas and Electric Co.	1-12" pipe
4	Water main	San Francisco Water Department	1-8" LP main 1-22" LP main *
5	Auxiliary water	San Francisco Department of Public Works	1-18" pipe *
6	Communication	Pacific Telephone & Telegraph Co.	1-18" pipe
7	Communication	Western Union	1-12" pipe
8	Police, Fire & Traffic signal system	San Francisco Department of Electricity	1-12" pipe



\* This service shall be a trunk line.

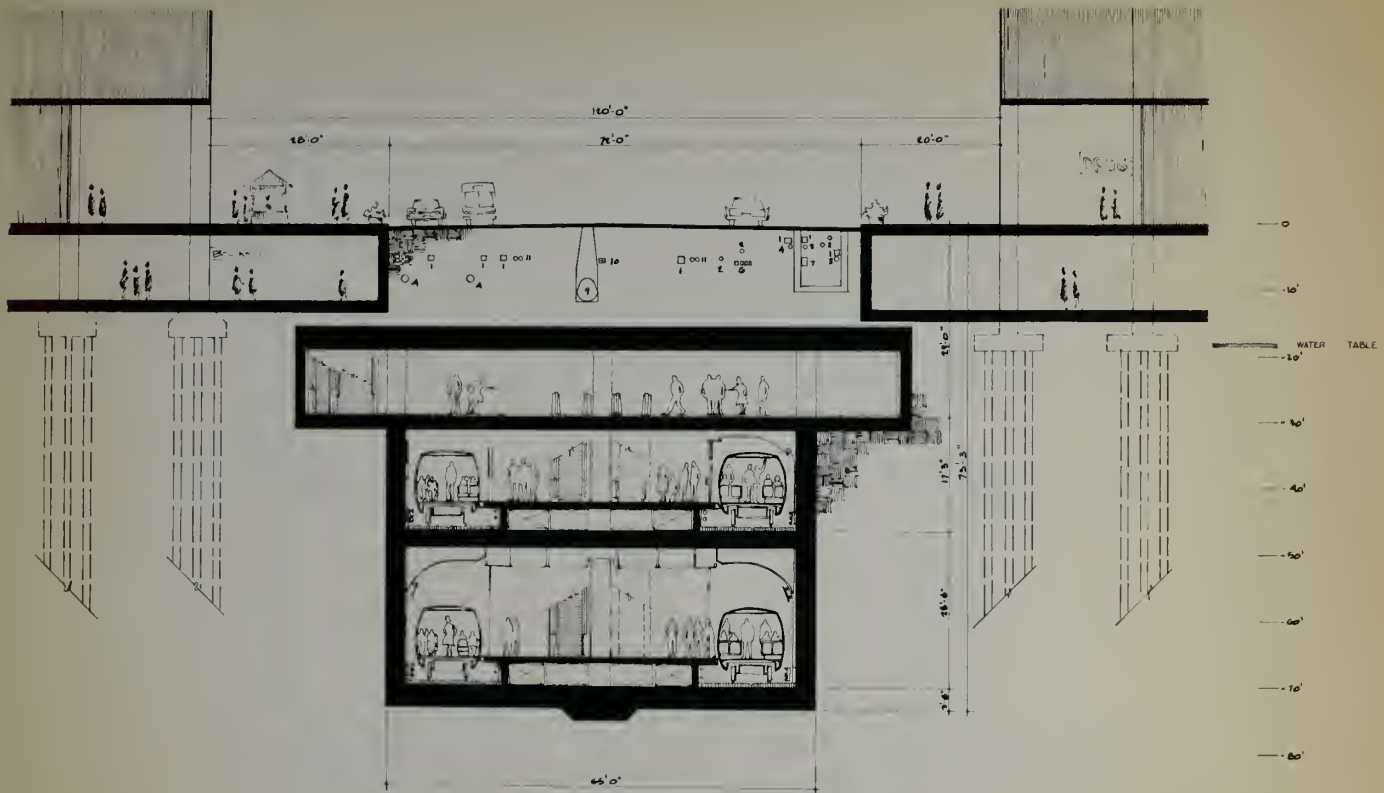


Symbol	Name	Utility Company	Description
1	Electric power	Pacific Gas and Electric Co.	1-18" Multiduct*
2.	Gas main	Pacific Gas and Electric Co.	1-12" LP pipe*
3	Steam main	Pacific Gas and Electric Co.	1-12" pipe in 33" encasement
4	Water main	San Francisco Water Department	1-8" CI pipe*
6	Communication	Pacific Telephone & Telegraph Co.	1-18" multiduct
7	Communication	Western Union	1-12" multiduct
8	Police, Fire & Traffic signal system	San Francisco Department of Electricity	1-12" multiduct
9	Sewers	San Francisco Department of Public Works	1-30" pipe sewers

\* The size of the above designated utilities are approximately suitable for feeder service. It is presumed that trunk and feeder facilities for these feeder lines will be relocated off Market Street.







MARKET STREET DESIGN REPORT

NO. 1  
STRUCTURE AND  
UTILITIES COMPARISONS





Description. This plan, as shown on the enclosed drawing, has a mezzanine 29'-0" below Market Street. The roof of the mezzanine is covered with 15'-0" of earth beneath the surface of the Street. Total depth of the station below the Street is 73'-3".

The plan is based on a conventional system of buried utility lines. Where possible, it contemplates supporting utilities in place during construction. Gas mains will require temporary relocation for safety and subsequently another move to their permanent locations. Auxiliary water supply service will be temporarily disconnected during construction and removed from the excavation. Sewer will require complete replacement. Some other utilities, such as electric and communication cable may be consolidated. Under this plan, the final location of all utilities will be under Market Street.

Feasibility. The construction methods and procedures for dealing with utilities described by this plan are conventional methods of subway construction and are technically feasible.

Cost. The estimated cost for construction and utility work at the Montgomery Street station under this plan is as follows:

Utilities	\$1, 990, 000
Station	8, 500, 000
Underpinning	<u>1, 180, 000</u>

TOTAL: \$11, 670, 000

Construction Time. Present construction scheduling indicates a probable three year construction period with final repaving of Market Street in two and one-half years. Utility work would proceed simultaneously with station construction.

Analysis. Because of the great depth of the station in this plan, construction is complicated by problems of extensive dewatering and underpinning.



There are several problems created by the need to support the utility lines in place:

1. Excavation of the station must be by hand until the excavation depth is clear of the deepest utility.
2. The exposed utility lines in the excavation are subject to damage and subsequent interruption of service. The advantage of this utility configuration is the ease of the north-south crossovers in the fifteen feet of earth above the mezzanine.

Other important disadvantages to this plan include the distance from the train to street and the three different escalators necessary for the trip. The plan virtually eliminates mezzanine connections to existing basements and would be very difficult to connect with other concourses or plazas. It also precludes the possibility of openings for light and air, but the depth of earth allows complete freedom in the location of landscaping.





P. G. & E. (Electric)

1. Break out splice and transformer manhole	\$ 60,000
2. Support ducts and replace (40%)	148,920
3. Building splicing and transformer manholes	235,000
4. Cable pull out and replacement	136,110
5. Switch gear and jumpers	20,000
6. Customer service	49,970
7. Miscellaneous	<u>300,000</u>
TOTAL:	<u>\$950,000</u>

P. G. & E. (Gas)

1. Longitudinal main: 2100' of 12" main @ \$20.00/ft.	\$ 42,000
2. Crossing at Montgomery St.: 275' of 16" main @ \$36.00/ft.	9,900
3. Crossing at 2nd St.: 350' of 12" main @ \$25.00/ft.	8,750
4. Intersecting tie-ins: (14) tie-ins	9,150
5. Temporary mains and services:	18,000
6. Service transfers-replacements: (18) services	<u>5,500</u>
TOTAL:	<u>\$93,300</u>



P. G. & E. (Steam)

1. Support of existing facilities \$ 30,000

Department of Electricity

## Police and Fire Alarm System

1. New Ducts and cable system \$ 90,555

2. Relocation of entry and exit points 45,975

3. Engineering design and contingencies 13,653

TOTAL: \*\$150,183

\* If PTT ducts remain in place, estimated  
cost to Department of Electricity is: \$ 10,000

Department of Electricity

## Traffic Signal

1. Adjustments to system \$ 12,800

Department of Public Works

## AWSS

1. Hydrant assemblies \$ 25,000

2. Valves and vaults 38,000

3. AWSS pipe 78,000

4. Miscellaneous 7,000

5. Traffic routing (temporary bridging) 32,000

TOTAL: \$180,000



Combination Sewers

1. Remove brick sewer and replace with 42 " reinforced concrete pipe and support in place:

1,000 @ \$120.00 per lin ft. \$120,000

S. F. Water Department

1. Support existing pipes in place \*\$ 30,000

\* Additional cost would be involved if water lines have to be relocated to clear piling or other construction.

P. T. & T.

1. Support of ducts \$125,000
  2. Trunk crossing \$125,000
  3. Cable \$ 75,000
- TOTAL: \$325,000

Western Union

1. Labor and overhead \$ 35,421
  2. Materials 32,188
  3. Conduits and manholes 31,030
- TOTAL: \$ 98,639
- TOTAL : \$1,989,922



## Basis of Utility Cost Estimate

P. G. & E.

Electric

Support in place where possible, anticipate 40% rebuilding of duct system with concomitant cable handling.

Gas

Temporary relocation on street surface prior to permanent relocation under street.

Steam

Support in place.

S.F. Water Department

Low pressure water line

Support in place, additional expense required for relocation of 22" line in the event of conflict of piling operation.

Department of Public Works

AWSS

Removal of pipe and appurtenances from excavation and replacement upon completion of station construction.

P. T. & T.

Relocate trunk lines from station area and support local feder system in place.

Western Union

Consolidate lines in central duct and support in place.





Department of Electricity

Displacement from P. T. & T.  
ducts requires new duct and cable  
system to be supported in place.

Department of Public Works

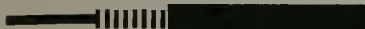
Sewers

Temporary fluming of sewers  
and rebuilding single 42" line.



## UTILITY RELOCATION TIME SCHEDULES - PLAN 1

UTILITY CORRIDOR



P.G. &amp; E.

ELECTRICITY



GAS



STEAM



DEPT. OF PUBLIC WORKS

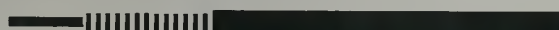
AWSS



SEWERS (comb.)



DEPT. OF ELECTRICITY



P.T. &amp; T.



S.F. WATER DEPT.



WESTERN UNION



TIME:

0 2 4 6 8 10 12 14 16 18  
MONTHS

Legend:

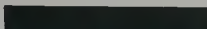
DESIGN



CONTRACT



CONSTRUCTION









Description. This plan is similar to Plan I except that the amount of earth over the station has been decreased from 15'-0" to 6'-0". Total depth of the station becomes 68'-0" and the mezzanine floor is 22'-0" below Market Street.

The utilities will be handled in a manner similar to Plan I. Because of the shallower depth of earth cover, more relocation work will be required and the sewer will probably have to be relocated to a position under the sidewalk basement vaults. Under this plan the final location of all utilities would remain in Market Street.

Feasibility. Construction of the station will be easier than in Plan I because of the shallower depth. Less underpinning and dewatering will be required. The utility relocation and support required by this plan is feasible.

Cost. The estimated cost for construction and utility work at the Montgomery Street station under this plan is as follows:

Utilities	\$ 1,883,000
Station	8,400,000
Underpinning	<u>1,001,000</u>

TOTAL \$11,284,000

Construction Time. Approximately six weeks can be saved on present construction schedules due to less excavation, bulkheading and backfill above the mezzanine. Utility work would proceed simultaneously with station construction.

Analysis. The simpler problems of underpinning and construction for this scheme are reflected in the lower costs estimated for the work. Although relocation of utilities is more extensive than in Plan I, total utility costs are slightly less because it is \$320,000 cheaper to consolidate the electric system rather than support it in place.





The modifications to Plan I, have eliminated many of the most serious objections to this type of scheme. The plan retains the ease of north-south utility crossovers but also retains the problem of potential utility service disruption during construction.

The possibility of connections to existing basements and new concourses or plazas is introduced. The plan retains good flexibility in the width of the traffic way, and the earth cover allows maximum freedom in the location of landscaping.



P. G. & E. (Electric)

1. Break out splice and transformer manhole	\$ 3,000
2. Building splicing and transformer manholes and ducts	167,900
3. Cable pull out and replacement	158,020
4. Switch gear and jumpers and relocate transformer gear	8,000
5. Customer service	103,120
6. Miscellaneous	<u>189,960</u>
TOTAL :	* \$ <u>630,000</u>

\* If present system is supported in place cost will be : \$ 950,000

P. G. & E. (Gas)

1. Longitudinal main: 2100' of 12" main @ \$20.00/ft.	\$ 42,000
2. Crossing at Montgomery Street: 275' of 16" main @ \$38.00/ ft.	10,450
3. Crossing at 2nd Street: 350' of 12" main @ \$27.00/ft.	9,450
4. Intersecting tie-ins: (14) tie-ins	9,150
5. Temporary mains and services :	18,000
6. Service transfers - replacements : (18) services	<u>6,100</u>
TOTAL :	\$ <u>95,150</u>



## PLAN 2A ( Cont'd )

P.G. & E. ( Steam )

1. Longitudinal mains	\$ 48,000
2. Crossing @ Anne Street	7,800
3. Manholes	10,000
4. Services	1,500
5. Support at Sutter Street	<u>13,000</u>
TOTAL :	\$ 80,300

Department of Electricity

## Police and Fire Alarm System

1. New ducts and cable system	\$ 90,555
2. Relocation of entry and exit points	45,975
3. Engineering design and contingencies	<u>13,653</u>
TOTAL :	* <u>\$ 150,183</u>

\* If PTT ducts remain in place, estimated cost to Department of Electricity is : \$ 10,000

Department of Electricity

## Traffic signal

1. Adjustments to system	<u>\$ 13,000</u>
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Department of Public Works

## AWSS

1. Hydrant assemblies	\$ 25,000
2. Valves and vaults	38,000
3. AWSS pipe	78,000
4. Miscellaneous	7,000
5. Traffic routing ( temporary bridging )	<u>32,000</u>
TOTAL :	<u>\$ 180,000</u>

## Combination Sewers

1. Remove brick sewer and replace with 2-24" reinforced concrete pipe and support in place: 2000' @ \$35.00 per lin. ft.	\$ 170,000
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S. F. Water Department

1. Lay temporary mains and service and disconnect existing main	\$ 37,415
2. Relocate and reconnect 22" main	31,300
3. Relocate 30" main	8,250
4. Relocate distribution mains and service connections	32,355
5. Design and supervision	<u>31,374</u>
TOTAL :	* <u>\$ 140,694</u>





PLAN 2A ( Cont'd )

45

\* Additional cost would be involved if water lines have to be relocated to clear piling or other construction.

P. T. & T.

1. Support of ducts	\$ 125,000
2. Trunk crossing	125,000
3. Cable	<u>75,000</u>
TOTAL :	\$ 325,000

Western Union

1. Labor and overhead	\$ 35,421
2. Materials	32,188
3. Conduits and manholes	<u>31,030</u>
TOTAL :	\$ <u>98,639</u>
TOTAL :	<u><u>\$1,982,966</u></u>



## PLAN 2A

## Basis of Utility Cost Estimate

P. G. & E.

Electric

Rebuild consolidated electrical system and support in place.

Gas

Temporary relocation on street surface prior to permanent relocation under street upon completion of construction.

Steam

Support in place, relocate steam facilities for transverse crossings.

S.F. Water Department

Low pressure water line

Relocate 22" main off Market Street, support service mains in place.

Department of Public Works

AWSS

Removal of pipe and appurtenances from excavation and replacement upon completion of station construction. (From standpoint of safety of operation, the Department would prefer to have this line permanently relocated off Market Street at cost of \$600,000).

P. T. & T.

Relocate trunk lines from station area and support local feeder system in place.



Western Union

Consolidate lines in central duct and support in place.

Department of Electricity

Displacement of P.T.&T. ducts requires new duct and cable system to be supported in place.

Department of Public Works

Sewers

Temporary fluming and rebuilding of dual lines upon completion of station construction.



## UTILITY CORRIDOR



## P.G. &amp; E.

## ELECTRICITY



## GAS



## STEAM



## DEPT. OF PUBLIC WORKS

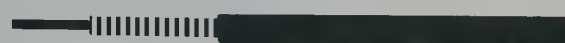
## AWSS



## SEWERS (comb.)



## DEPT. OF ELECTRICITY



## P.T. &amp; T.



## S.F. WATER DEPT.



## WESTERN UNION



TIME:

0 2 4 6 8 10 12 14 16 18

MONTHS

## Legend:

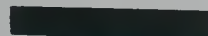
## DESIGN



## CONTRACT

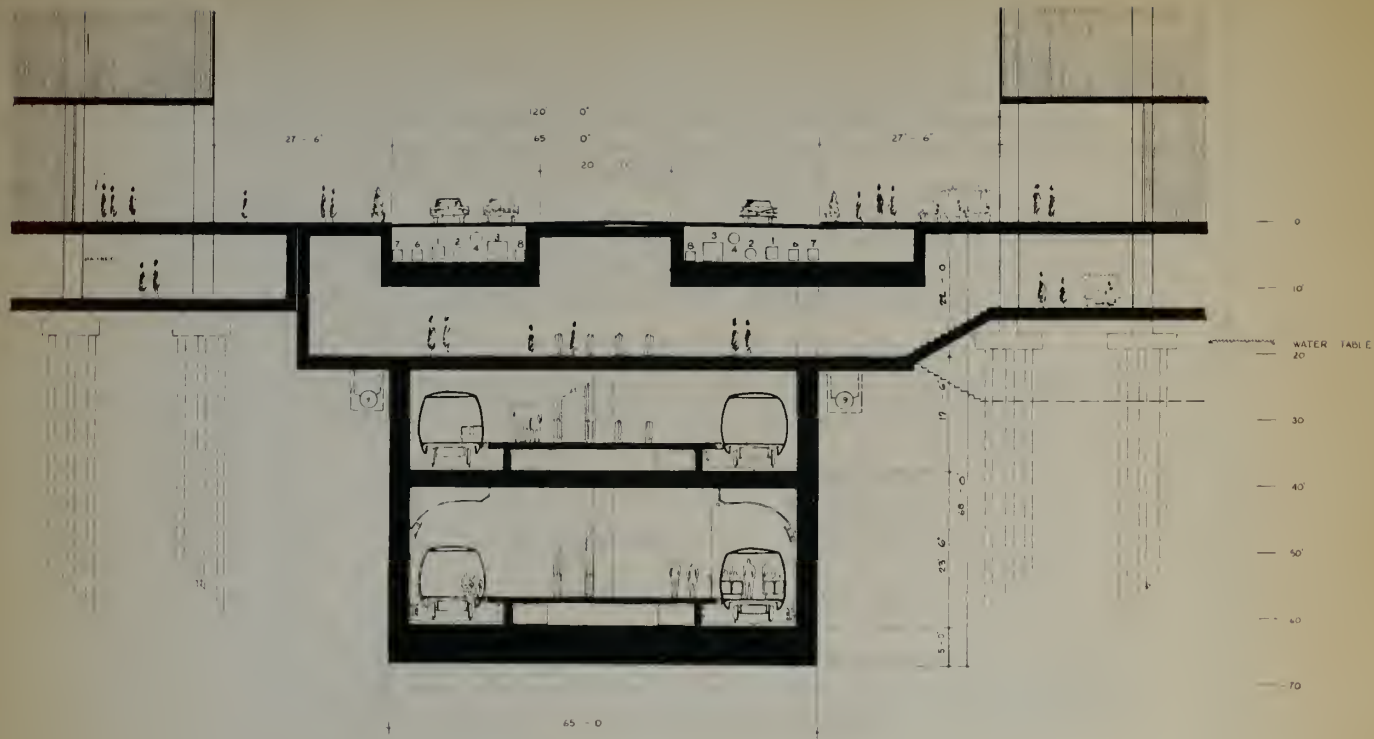


## CONSTRUCTION











## PLAN 2 B

Description. This plan is similar to Plan 1 and a slight modification of Plan 2 A. The depth of earth cover above the station remains 6'-0" and all other dimensions are the same.

The difference from Plan 2 A is the introduction of a dual, symmetrical utility arrangement on each side of the street. Utilities would be temporarily relocated during construction, then would be replaced in the street in new dual systems. High pressure (AWSS) and low pressure (SFWD) water mains would be moved to a location off Market Street.

Feasibility. Construction of the station is virtually identical to Plan 2 A and is completely feasible. The concept of a split utility system is not only feasible but desirable to several of the utility companies.

Cost. The estimated cost for construction and utility work at the Montgomery Street station under this plan is as follows:

Utilities	\$1,998,000
Station	8,850,000
Underpinning	<u>1,001,000</u>

TOTAL: \$11,849,000

Construction Time. Although the shallower station construction would save six weeks due to less excavation, bulkheading and backfill, the time saving could be consumed by the additional utility relocation.

Analysis. Construction of the station is virtually identical to Plan 2 A and the costs for these items remain the same. Utility costs are increased slightly by the introduction of a dual system.

This plan has the added advantage of potential openings from the mezzanine for natural light and air. These opening could not occur



where a north-south utility line crossed over the station.

51

Other characteristics of the plan are identical to Plan 2 A.



P. G. & E. (Electric)

1. Break out splice and transformer manhole	\$ 3,000
2. Building splicing and transformer manholes and ducts	167,900
3. Cable pull out and replacement	158,020
4. Switch gear and jumpers and relocated	8,000
5. Customer service	103,120
6. Miscellaneous	<u>189,960</u>
TOTAL:	<u>\$630,000</u>

If present system is supported in place cost would be: \$950,000

P. G. & E. (Gas)

1. Longitudinal main: 2100' of 12" main @ \$20.00/ft.	\$ 42,000
2. Crossing at Montgomery St.: 300' of 16" main @ \$50.00/ft.	15,000
3. Crossing at 2nd St.: 350' of 12" main @ \$35.00/ft.	12,250
4. Intersecting tie-ins: (14) tie-ins	9,150
5. Temporary mains and services :	18,000
6. Service transfers - replacements : (18) services	<u>6,100</u>
TOTAL :	<u>\$ 95,150</u>





## PLAN 2 B (Cont'd)

P. G. & E. (Steam)

1. Longitudinal mains	\$ 48,000
2. Crossing at Anne Street	7,800
3. Manholes	10,000
4. Services	1,500
5. Support at Sutter Street	<u>13,000</u>
TOTAL:	<u>\$ 80,300</u>

Department of Electricity

## Police and Fire Alarm System

1. New ducts and cable system	\$ 90,555
2. Relocation of entry and exit points	45,975
3. Engineering design and contingencies	<u>13,653</u>
TOTAL:	<u>\$150,183</u>

## Traffic Signal

1. Adjustments to system	<u>\$ 12,830</u>
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Department of Public Works

## AWSS

1. Hydrant assemblies	\$ 25,000
2. Valves and vaults	59,000



Department of Public Works (Cont'd)

3. AWSS pipe	\$368,000
4. Miscellaneous	60,000
5. Traffic routing (temporary bridging)	<u>88,000</u>
TOTAL:	<u>\$600,000</u>

Combination Sewers

1. Remove brick sewer and replace with 2-24" reinforced concrete pipe and support in place: 2000' @ \$85.00 per lin. ft.	<u>\$170,000</u>
---	------------------

S. F. Water Department (22" line relocated  
off Market Street )

1. Install 8500 lin. ft. 22' line @ \$42.00 per lin. ft.	\$357,000
2. Connections, valves and surveys	29,400
3. 4200' - 8" main @ \$25.00 per lin. ft.	105,000
4. 12 connections @ \$1,000 each	12,000
5. Engineering and miscellaneous	<u>78,300</u>
TOTAL:	<u>\$ 581,700</u>
(for four stations)	

Charged against  
one station: \$145,425



P. T. & T.

1.	Support of ducts	\$ 125,000
2.	Trunk crossing	125,000
3.	Cable	<u>75,000</u>
	TOTAL:	<u>\$ 325,000</u>

Western Union

1.	Labor and overhead	\$ 35,421
2.	Materials	32,188
3.	Conduits and manholes	<u>31,030</u>
	TOTAL:	<u>\$ 98,639</u>
	TOTAL :	<u><u>\$1,997,527</u></u>



## Basis of Utility Cost Estimate

P. G. & E.

Electric

Rebuild consolidated electrical system and support in place.

Gas

Temporary relocation on street surface prior to permanent relocation under street upon completion of construction.

Steam

Support in place, relocate steam facilities for transverse crossings.

S. F. Water Department

Low pressure water line

Relocate 22" main off Market Street, support service mains in place.

Department of Public Works

AWSS

Relocate high pressure lines off Market Street.

P. T. & T.

Relocating of trunk lines from station area and support of local feeder system.

Western Union

Consolidate lines in central duct and support in place.





Department of Electricity

Displacement from P. T. & T.  
ducts requires new duct and cable  
system to be supported in place.

Department of Public Works

Sewers

Temporary fluming and rebuild-  
ing of dual lines upon completion  
of station construction.



UTILITY CORRIDOR



P.G. &amp; E.

ELECTRICITY



GAS



STEAM



DEPT. OF PUBLIC WORKS

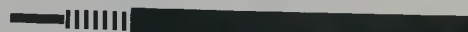
AWSS



SEWERS (comb.)



DEPT. OF ELECTRICITY



P.T. &amp; T.



S.F. WATER DEPT.



WESTERN UNION



TIME:

0

2

4

6

8

10

12

14

16

18

MONTHS

Legend:

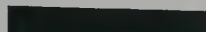
DESIGN



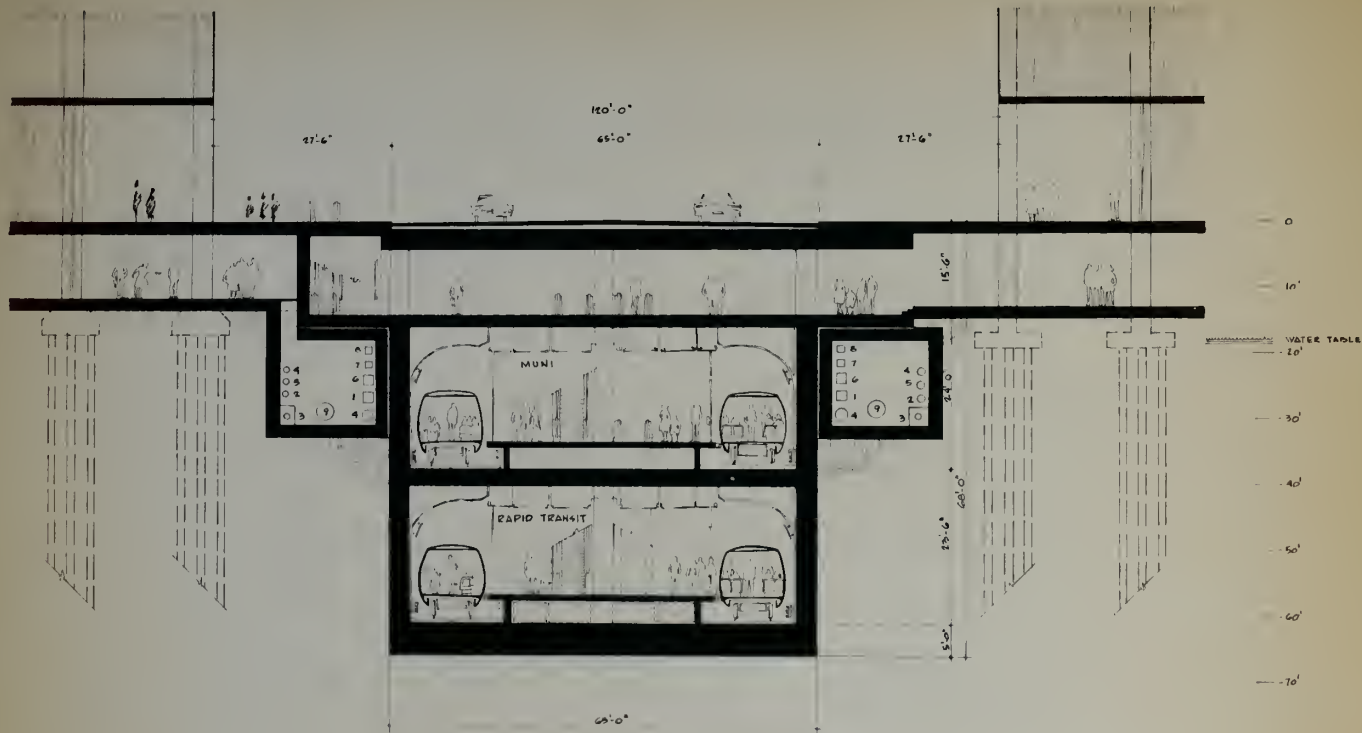
CONTRACT



CONSTRUCTION









Description. This plan, as shown on the drawing, embodies a different concept of utility location. In this case utilities have been placed in walk-through tunnels below the station mezzanines and outside of the station structure. The tunnels would be ventilated in conjunction with the subway vent system.

The mezzanine floor is 15'-6" below the street surface. There is no earth between the station structure and the street surface. Total depth of the structure is 68'-0". A dual utility system split between the two tunnels is contemplated. All utilities would be relocated prior to station construction.

Feasibility. Because of the removal of the weight of 6'-0" of earth over the station, the structure is lighter and some problems of bouyancy are encountered. Additional concrete has been added to the base slab to compensate for this weight loss.

Location of the utilities in tunnels is a feasible solution although special problems of access and watertight integrity are created by the deep location of the tunnels.

Cost. The estimated cost for construction and utility work at the Montgomery Street station under this plan is as follows:

Utilities	\$2, 014, 500
Utilities Tunnels	1, 093, 500
Station Const.	8, 800, 000
Underpinning	<u>1, 001, 000</u>

TOTAL: \$12, 909, 000

Construction. Construction of the deep utility tunnels and relocation of all utilities prior to station construction is required to make this plan economically feasible. This work would add approximately one year to BARTD construction schedules.





Analysis. The deep utility tunnels below the mezzanine introduce several problems:

1. Provisions for service connections must be made at the time of the tunnel construction and a cost allowance has been made for this in the estimate.
2. In case of a major utility disaster in the tunnel, it would be difficult to reach with heavy equipment and the tunnel might flood. North-south utility crossovers would be made in a special tunnel just below the mezzanine.

Advantages of the plan include:

1. The absence of street disruption for future utility maintenance.
2. The ease of mezzanine connections to adjacent properties or concourses.
3. The ease of opening of the mezzanine to light and air.
4. The pleasantness of the station environment that could be created.

Special planting boxes would have to be constructed for street surface landscaping.



## PLAN 3A

P. G. & E. (Electric)

1. Break out splice and transformer manhole	\$ 3,000
2. Building splicing and transformer manholes and ducts	167,900
3. Cable pull out and replacement	158,020
4. Switch gear and jumpers and relocated	8,000
5. Customer service	103,120
6. Miscellaneous	<u>189,960</u>
TOTAL:	\$630,000

P. G. & E. (Gas)

1. Longitudinal main: 2100' of 12" main @ \$20.00/ft.	\$ 42,000
2. Crossing at Montgomery St.: 300' of 16" main @ \$50.00/ft.	15,000
3. Crossing at 2nd St.: 350' of 12" main @ \$35.00/ft.	12,250
4. Intersecting tie-ins: (14) tie-ins	9,500
5. Temporary main and services:	8,000
6. Service transfers-replacements (18) services	<u>6,500</u>
TOTAL:	<u>\$ 93,250</u>



## PLAN 3A ( Cont'd )

P. G. & E. ( Steam )

1. Longitudinal mains	\$ 47,100
2. Crossing at Anne Street	11,700
3. Manholes	10,000
4. Services	1,500
5. Support at Sutter Street	<u>13,000</u>
<b>TOTAL :</b>	<b>\$ <u>83,300</u></b>

Department of Electricity

## Police and Fire Alarm System

1. New ducts and cable system	\$ 85,320
2. Relocation of entry and exit points	22,692
3. Engineering design and contingencies	<u>10,801</u>
<b>TOTAL:</b>	<b>\$ <u>118,813</u></b>

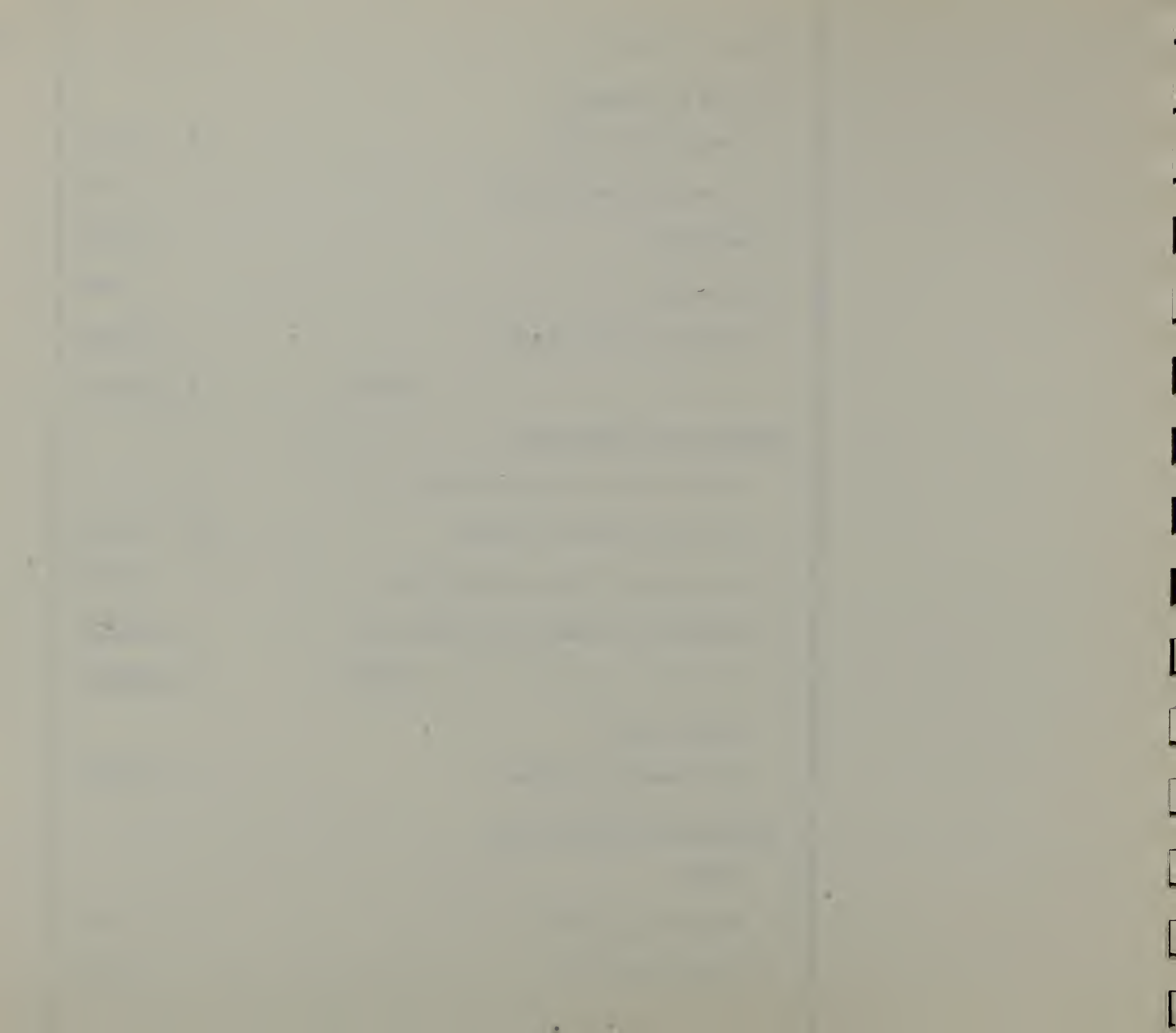
## Traffic Signal

1. Adjustments to system	<u>\$ 12,900</u>
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Department of Public Works

## AWSS

1. Hydrant assemblies	\$ 25,000
2. Valves and vaults	32,000



## PLAN 3A ( Cont'd )

3. AWSS pipe	\$ 172,000
4. Miscellaneous	30,000
5. Traffic routing ( temporary bridging )	<u>41,000</u>
TOTAL :	<u>\$ 300,000</u>

## Combination Sewers

1. Remove brick sewer and replace with 2-24" reinforced concrete pipe and support in place: 2000' @ \$85.00 per lin. ft.	<u>\$ 170,000</u>
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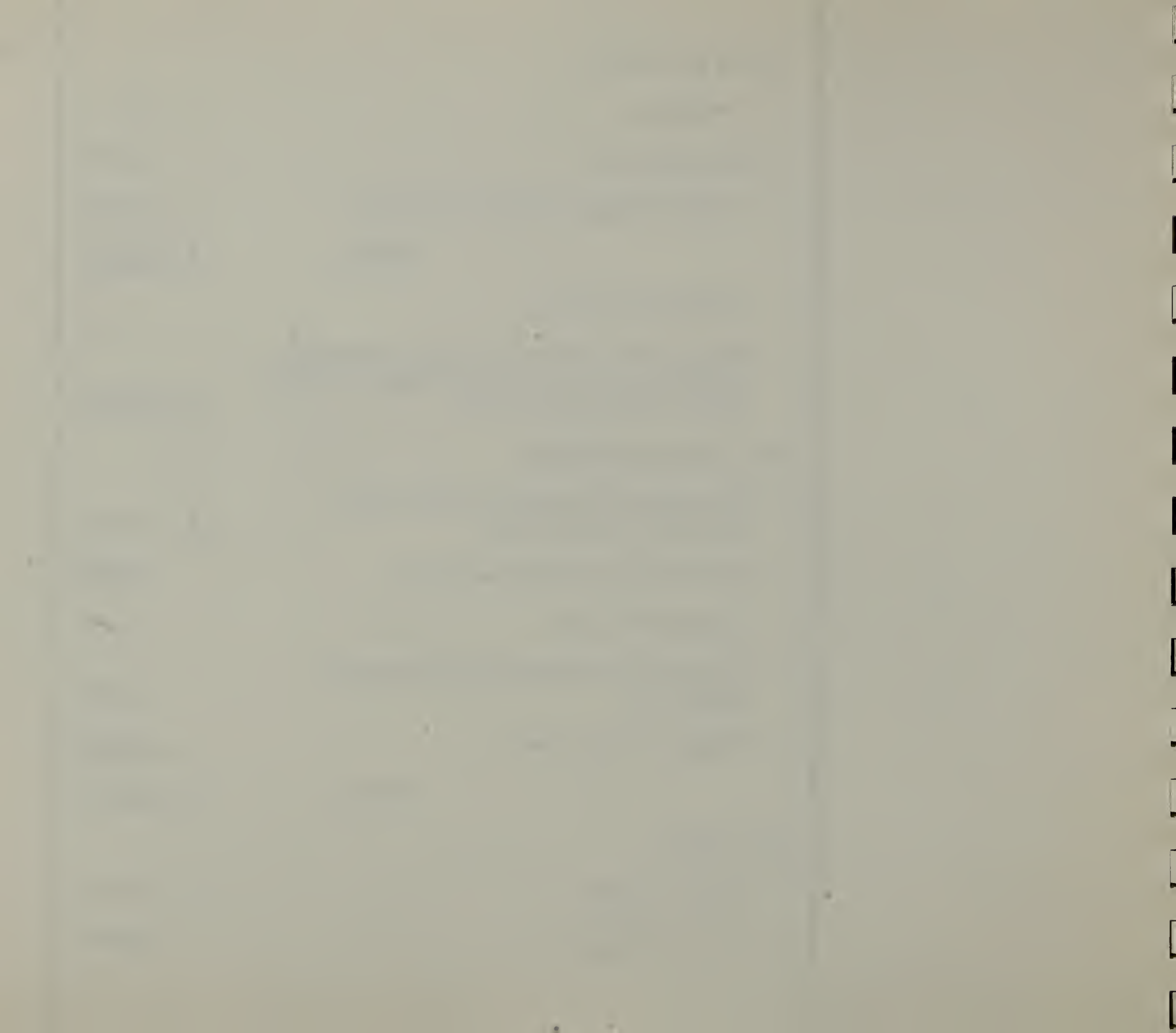
S. F. Water Department

1. Lay temporary mains and service and disconnect existing main	\$ 37,415
2. Relocate and reconnect 22" main	43,425
3. Relocate 30" main	8,250
4. Relocate distributing mains and service connections	51,505
5. Design and supervision	<u>40,350</u>
TOTAL :	<u>\$ 180,945</u>

P. T. & T.

1. Support of ducts	\$ 125,000
2. Trunk Crossing	125,000





## PLAN 3A ( Cont'd )

3. Cable	\$ 75,000
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TOTAL:	\$ 325,000
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Western Union

1. Labor and overhead	\$ 31,543
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2. Materials	30,843
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3. Conduits and manholes	37,910
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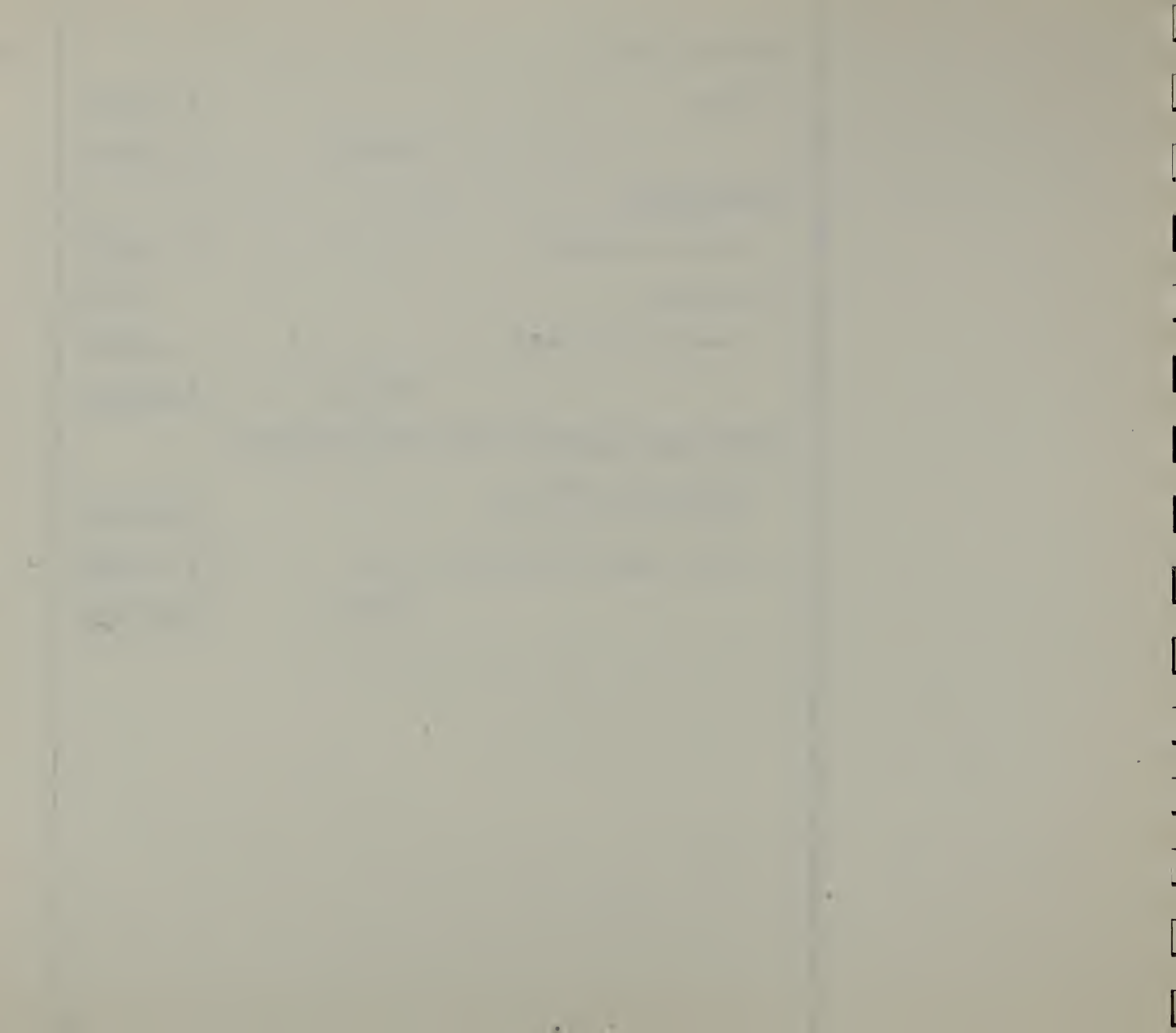
TOTAL :	\$ 100,296
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Utility Tunnel Structures Below Sidewalk Basement

1. 2-21' x 17' x 1100 \$490.00 lin. ft. x 2200=	\$1,080,000
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2. Utility tunnel for transverse crossing	\$ 13,500
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TOTAL :	\$3,108,004
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Basis of Utility Cost Estimate

All utilities to be relocated into tunnels completed prior to station construction.



## UTILITY CORRIDOR



## P.G. &amp; E.

## ELECTRICITY



## GAS



## STEAM



## DEPT. OF PUBLIC WORKS

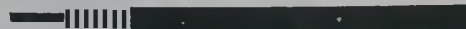
## AWSS



## SEWERS (comb.)



## DEPT. OF ELECTRICITY



## P.T. &amp; T.



## S.F. WATER DEPT.



## WESTERN UNION



TIME:

0

2

4

6

8

10

12

14

16

18

MONTHS

## Legend:

DESIGN

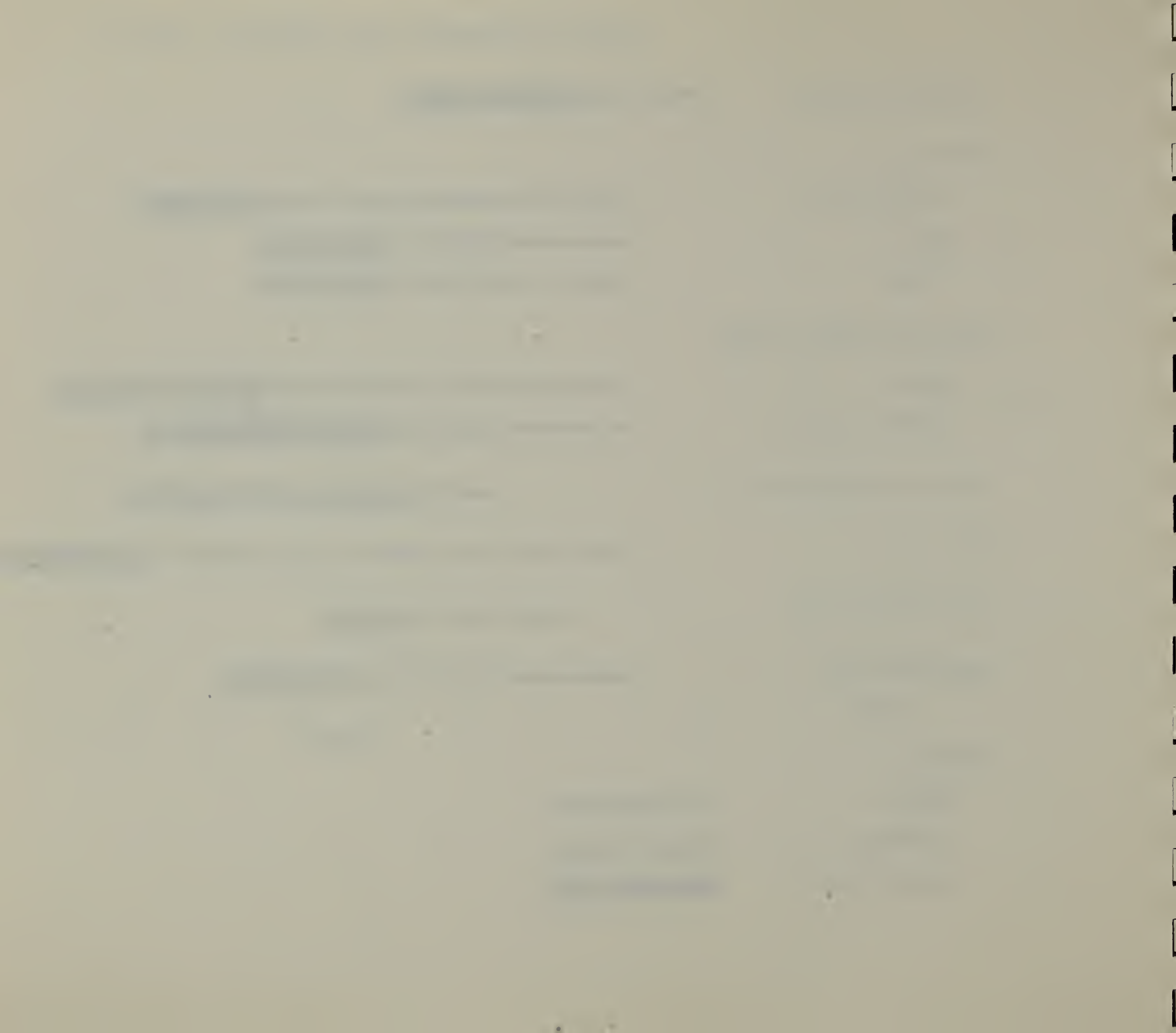


CONTRACT



CONSTRUCTION











Description. This plan is similar to Plan 3A except that the utility tunnels have been reduced to minimum size and included in the subway station structure. The mezzanine remains at 15'-6" below the street and the total depth of the station becomes 68'-6".

All utilities would be relocated prior to station construction. A dual symmetrical system would be installed on each side of the street.

Feasibility. Although rupture of a utility main would be a slight hazard to the subway system, this type of utility tunnel appears to be feasible. Construction of the utility tunnel in a way that will allow its later incorporation into the subway structure is a unique but feasible engineering problem.

Cost. The estimated cost for construction and utility work at the Montgomery Street station under this plan is as follows:

Utilities	\$2,316,000
Utility Cross-over Box	13,500
Station	8,850,000
Underpinning	<u>1,001,000</u>

TOTAL: \$12,180,000

Construction Time. Construction of the utility tunnels and relocation of all utilities prior to station construction is required to make this plan economically feasible. This work would add approximately one year to BARTD construction schedules.

Analysis. Utility tunnels built into the station structure are less costly but could cause problems in the event of a major utility rupture. Apart from these two factors, the characteristics of Plan 3 A and 3 B are virtually identical. The same advantages and disadvantages apply to both.



P. G. & E. ( Electric )

1. Break out splice and transformer manhole	\$ 3,000
2. Building splicing and transformer manholes and ducts	167,900
3. Cable pull out and replacement	158,020
4. Switch gear and jumpers & relocate transformer gear	8,000
5. Customer service	103,120
6. Miscellaneous	<u>189,960</u>
TOTAL :	<u>\$ 630,000</u>

P. G. & E. ( Gas )

1. Longitudinal main: 2100' of 12" main @ \$20.00/ft.	\$ 42,000
2. Crossing at Montgomery Street: 275' of 16" main @ \$38.00/ft.	10,450
3. Crossing at 2nd Street: 350' of 12" main @ \$27.00/ft.	9,450
4. Intersecting tie-ins: ( 14 ) tie-ins	9,150
5. Temporary mains and services :	18,000
6. Service transfers - replacements : ( 18 ) services	<u>6,100</u>
TOTAL :	<u>\$ 95,150</u>



PLAN 3B ( Cont'd )

71

P. G. & E. ( Steam )

1. Longitudinal main	\$ 47,100
2. Crossing at Anne Street	11,700
3. Manholes	10,000
4. Services	1,500
5. Support at Sutter Street	<u>13,000</u>
TOTAL :	<u>\$ 83,300</u>

Department of Electricity

Police and Fire Alarm System

1. New ducts and cable system	\$ 85,320
2. Relocation of entry and exit points	22,692
3. Engineering design and contingencies	<u>10,801</u>
TOTAL :	<u>\$ 118,813</u>

Traffic signal

1. Adjustments to system	<u>\$ 12,900</u>
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Department of Public Works

AWSS

1. Hydrant assemblies	\$ 25,000
2. Valves and vaults	59,000



PLAN 3B ( Cont'd )

72

3. AWSS pipe	\$ 368,000
4. Miscellaneous	60,000
5. Traffic routing ( temporary bridging )	<u>88,000</u>
TOTAL :	<u>\$ 600,000</u>

Combination Sewers

1. Remove brick sewer and replace with 2-24" reinforced concrete pipe and support in place 2000' @ \$85.00 lin. ft.	<u>\$ 170,000</u>
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S.F. Water Department

1. Lay temporary mains and service and disconnect existing main	\$ 37,415
2. Relocate & reconnect 22" main	43,425
3. Relocate 30" main	8,250
4. Relocate distribution mains & service connections	51,505
5. Design and supervision	<u>40,350</u>
TOTAL :	<u>\$ 180,945</u>

P. T. & T.

1. Support of ducts	\$ 125,000
2. Trunk crossing	125,000





PLAN 3B ( Cont'd )

73

3. Cable	\$ 75,000
TOTAL :	<u>\$ 325,000</u>

Western Union

1. Labor and overhead	\$ 31,543
2. Materials	30,843
3. Conduits and manholes	<u>37,910</u>
TOTAL :	<u>\$ 100,296</u>

Utility Tunnel Structures below Mezzanine

Utility tunnel structure cost estimated in basic station structure cost.

Utility tunnel for transverse crossing	<u>\$ 13,500</u>
TOTAL :	<u><u>\$2,329,904</u></u>



### Basis of Utility Cost Estimate

Complete relocation of all utility lines into tunnels prior to station construction.

Dual sewers to be constructed below basement levels.

High pressure and low pressure water mains to be permanently relocated off Market Street.

Cost of utility tunnel is included in the total structure cost of station.



UTILITY CORRIDOR



P.G. &amp; E.

ELECTRICITY



GAS



STEAM



DEPT. OF PUBLIC WORKS

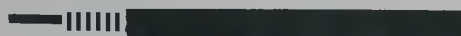
AWSS



SEWERS (comb.)



DEPT. OF ELECTRICITY



P.T. &amp; T.



S.F. WATER DEPT.



WESTERN UNION



TIME:

0

2

4

6

8

10

12

14

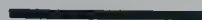
16

18

MONTHS

Legend:

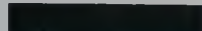
DESIGN



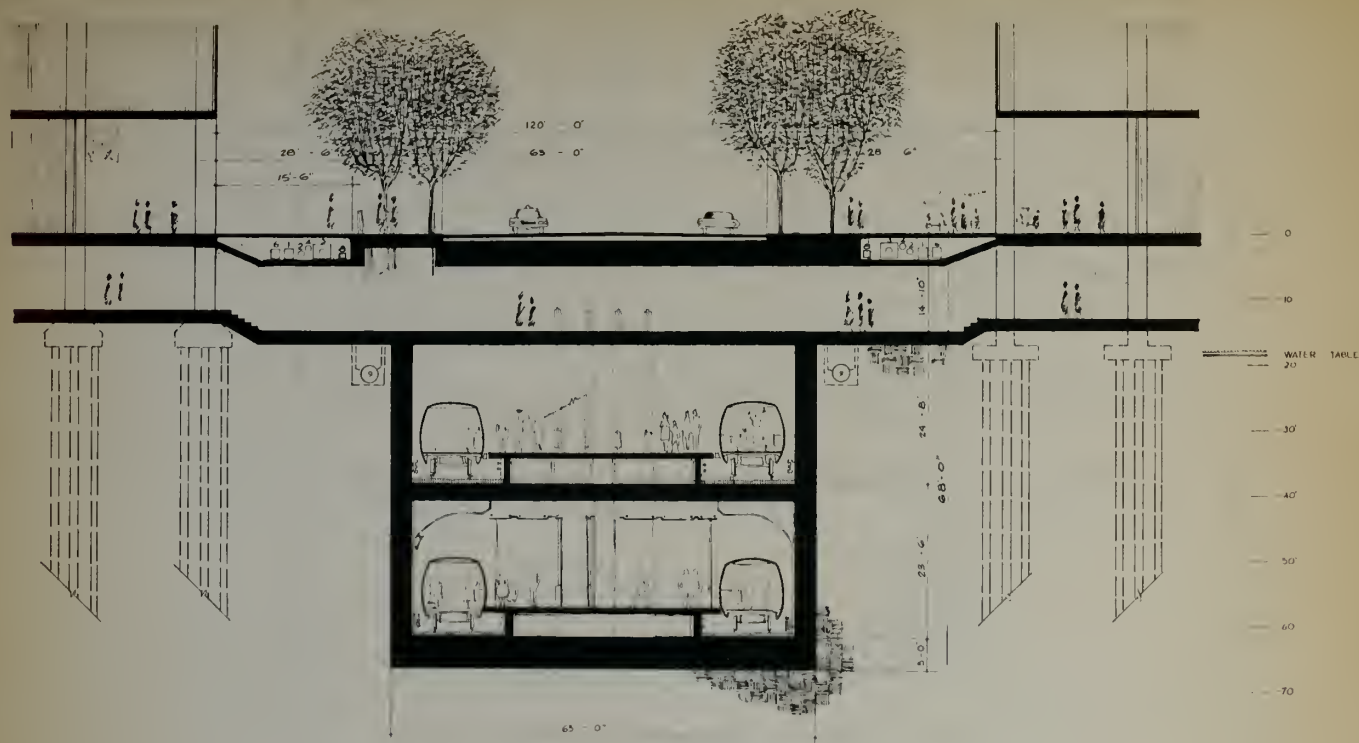
CONTRACT



CONSTRUCTION











Description. This plan introduces a third basic method of locating utilities on Market Street. Under this plan, all of the larger utilities (high and low pressure water and telephone) are to be permanently relocated off Market Street. A dual sewer system would be located beneath the mezzanine on each side of the station structure. The remaining utilities are to be placed in special chases beneath the sidewalk.

The mezzanine floor will be 14'-10" below the street surface. Total depth of the station will be 54'-0". There will be no earth fill over the mezzanine.

Feasibility. The sidewalk chase is a feasible location for utilities if the large lines and ducts of the water and telephone systems are taken off Market Street.

Construction of the sidewalk chase is feasible if the sidewalk vault space is vacated along the length of the station.

Cost. The estimated cost of station construction and utilities work under this plan is as follows:

Utilities	\$2,273,000
Utility Chases	900,000
Utility Crossovers	8,800,000
Station	<u>1,001,000</u>
Underpinning	

TOTAL: \$12,974,000

Construction Time. The construction schedule for this plan depends primarily on how decisively the City of San Francisco can act to insure availability of the sidewalk vaults. Assuming this space can be vacated within nine months, and that construction and underpinning can proceed immediately thereafter, construction



of the utility chases and relocation of all utilities prior to station excavation will add three months to BARTD's present construction schedule.

Analysis. The sidewalk chase offers the greatest utility efficiencies of any of the three possible utility locations: *cies*

1. Service connection to adjacent buildings is very easy and inexpensive.
2. Maintenance can be done with a minimum disruption of the street surface.
3. Access for maintenance or replacement is facilitated.
4. Because the utilities would be relocated prior to station excavation, the danger of service disruption in the downtown area due to construction accidents is eliminated.

The disadvantages of this utility location include the disruption of the sidewalk surface that would occur during construction, and the limitations on special sidewalk paving necessitated by future access points. Surface landscaping of the street would require special planting boxes.

Opportunities for connection to adjacent properties or concourses are maximized by the shallowness of the mezzanine. Mezzanine openings for natural light and air are possible and the stations would have good design potential.



P. G. & E. ( Electric )

1. Break out splice and transformer manhole	\$ 3,000
2. Building splicing and transformer manholes and ducts	167,900
3. Cable pull out and replacement	158,020
4. Switch gear and jumpers and relocate transformer gear	8,000
5. Customer service	103,120
6. Miscellaneous	<u>189,960</u>
TOTAL :	<u>\$ 630,000</u>

P. G. & E. ( Gas )

1. Longitudinal main: 2100' of 12" main @ \$20.00/ft.	\$ 42,000
2. Crossing at Montgomery Street: 300' of 16" main @ \$50.00/ft.	15,000
3. Crossing at 2nd Street: 350' of 12" main @ \$35.00/ft.	12,250
4. Intersecting tie-ins: ( 14 ) tie-ins	9,500
5. Temporary main and services :	8,000
6. Service transfers - replacements ( 18 ) services	<u>6,500</u>
TOTAL :	<u>\$ 93,250</u>



## PLAN 4A ( Cont'd )

P. G. & E. ( Steam )

1. Longitudinal main	\$ 47,100
2. Crossing at Anne Street	11,700
3. Manholes	10,000
4. Services	1,500
5. Support at Sutter Street	<u>13,000</u>
TOTAL :	<u>\$ 83,300</u>

Department of Electricity

## Police and Fire Alarm System

1. New ducts and cable system	\$ 81,447
2. Relocation of entry and exit points	21,382
3. Engineering design and contingencies	<u>10,283</u>
TOTAL :	<u>\$ 113,112</u>

Department of Electricity

## Traffic signal

1. Adjustments to system	<u>\$ 12,900</u>
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Department of Public Works

## AWSS

1. Hydrant assemblies	\$ 25,000
2. Valves and vaults	59,000
3. AWSS pipe	368,000
4. Miscellaneous	60,000
5. Traffic routing ( temporary bridging )	<u>88,000</u>
TOTAL :	<u>\$ 600,000</u>

## Combination Sewers

1. Remove brick sewer and replace with 2-24" reinforced concrete pipe and support in place: 2000' @ \$85.00 lin. ft.	<u>\$ 170,000</u>
---	-------------------

S.F. Water Department

## 22" line relocated off Market Street

1. Install 8500 lin. ft. 22" line @ \$42.00 per lin. ft.	\$ 357,000
2. Connections, valves and surveys	29,400
3. 4200' - 8" main @ \$25.00 per lin. ft.	105,000
4. 12 connections @ \$1,000 each	12,000



5. Engineering and miscellaneous \$ 78,300

TOTAL : \$ 581,700  
( for four stations)

Charged against  
one station: \$ 145,425

P. T. & T.

1. Support of ducts \$ 125,000

2. Trunk crossing 125,000

3. Cable 75,000

TOTAL : \$ 325,000

Western Union

1. Labor and overhead \$ 31,543

2. Materials 30,843

3. Conduits and manholes 37,910

TOTAL : \$ 100,296

Common Utility Conduit ( under sidewalk )  
2200' @ \$400.00 per lin. ft. \$ 880,000

Transverse crossing \$ 20,000

TOTAL : \$3,173,000



### Basis of Utility Cost Estimate

All utilities to be permanently relocated in dual sidewalk utility channels prior to station construction.

High pressure and low pressure mains are to be permanently re-located off Market Street.

Dual sewers to be located beneath basement level.



UTILITY CORRIDOR



P.G. & E.

ELECTRICITY



GAS



STEAM



DEPT. OF PUBLIC WORKS

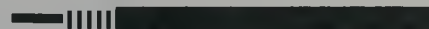
AWSS



SEWERS (comb.)



DEPT. OF ELECTRICITY



P.T. & T.



S.F. WATER DEPT.



WESTERN UNION



TIME:

0 2 4 6 8 10 12 14 16 18

MONTHS

Legend:

DESIGN



CONTRACT



CONSTRUCTION







UTILITY CORRIDOR



P.G. &amp; E.

ELECTRICITY



GAS



STEAM



DEPT. OF PUBLIC WORKS

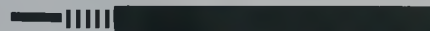
AWSS



SEWERS (comb.)



DEPT. OF ELECTRICITY



P.T. &amp; T.



S.F. WATER DEPT.



WESTERN UNION



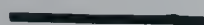
TIME:

0 2 4 6 8 10 12 14 16 18

MONTHS

Legend:

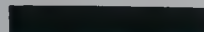
DESIGN



CONTRACT



CONSTRUCTION





Description. The utility location and the mezzanine configuration under this plan is identical to Plan 4A. In this case, "cut and cover" construction between stations is contemplated in order to derive maximum structural benefits from the shallow mezzanine. The mezzanine is 14'-10" below the surface and the bottom of the station is 54'-0" deep--14'-0" less than any of the previous plans.

Feasibility. The utility configuration of this plan is identical to Plan 4A and thus equally feasible.

Construction by the "cut and cover" method is a conventional system of subway building.

Cost. Cost of utility work under this plan would be identical to Plan 4A.

Cost of the subway construction cannot be discussed in terms of the Montgomery Street station because the largest item of cost comparison is tunneling versus "cut and cover". Preliminary investigation of these costs indicates that there is a possibility of extensive savings on "cut and cover" construction.

Construction Time. Construction time for this system would be comparable to Plan 4A and would again depend on the ability of the City to make the sidewalk vaults available within nine months.

Analysis. Tunnel construction between stations requires that the uppermost tube must be at least one tunnel diameter (20 feet) below the street surface at each end of the station. This requirement predetermines a total station depth of at least 68'-0". In Plan 4B, this depth can be reduced to 54'-0". Extensive savings are possible due to lesser requirements for underpinning, dewatering, excavation and volume of new construction.



## PLAN 4B

P. G. & E. (Electric)

1. Break out splice and transformer manhole	\$ 3,000
2. Building splicing and transformer manholes and ducts	167,900
3. Cable pull out and replacement	158,020
4. Switch gear and jumpers and relocated transformer gear	8,000
5. Customer service	103,120
6. Miscellaneous	<u>189,960</u>
TOTAL:	<u>\$630,000</u>

P. G. & E. (Gas)

1. Longitudinal main: 2100' of 12" main @ \$20.00/ft.	\$ 42,000
2. Crossing at Montgomery Street: 300' of 16" main @ \$50.00/ft.	15,000
3. Crossing at 2nd Street: 350' of 12" main @ \$35.00/ft.	12,250
4. Intersecting tie-ins: (14) tie ins	9,500
5. Temporary main and services:	8,000
6. Service transers-replacements (18) services	<u>6,500</u>
TOTAL:	\$ 93,250



PLAN 4B ( Cont'd )

88

P. G. & E. ( Steam )

1. Longitudinal main	\$ 47,100
2. Crossing at Anne Street	11,700
3. Manholes	10,000
4. Services	1,500
5. Support at Sutter Street	<u>13,000</u>
TOTAL :	<u>\$ 83,300</u>

Department of Electricity

Police and Fire Alarm System

1. New ducts and cable system	\$ 81,447
2. Relocation of entry and exit points	21,382
3. Engineering design and contingencies	<u>10,283</u>
TOTAL :	<u>\$ 113,112</u>

Department of Electricity

Traffic Signal

1. Adjustments to system	<u>\$ 12,900</u>
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Department of Public Works

AWSS

1. Hydrant assemblies	\$ 25,000
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PLAN 4B ( Cont'd )

89

2. Valves and vaults	\$ 59,000
3. AWSS pipe	368,000
4. Miscellaneous	60,000
5. Traffic routing ( temporary bridging )	<u>88,000</u>
TOTAL :	<u>\$ 600,000</u>

Combination Sewers

1. Remove brick sewer and replace with 2-24" reinforced concrete pipe and support in place: 2000' @ \$85.00 lin. ft.	<u>\$ 170,000</u>
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S. F. Water Department

22" line relocated off Market Street

1. Install 8500 lin. ft. 22" line @ \$42.00 per lin. ft.	\$ 357,000
2. Connections, valves and surveys	29,400
3. 4200' - 8" main @ \$25.00 per lin. ft.	105,000
4. 12 connections @ \$1,000 each	12,000
5. Engineering and miscellaneous	<u>78,300</u>
TOTAL :	<u>\$ 581,700</u>
( for four stations)	

Charged against  
one station: \$ 145,425



PLAN 4B (Cont'd)

P. T. & T.

1. Support of ducts	\$ 125,000
2. Trunk crossing	125,000
3. Cable	<u>75,000</u>
TOTAL :	<u>\$ 325,000</u>

Western Union

1. Labor and overhead	\$ 31,543
2. Materials	30,843
3. Conduits and manholes	<u>37,910</u>
TOTAL :	<u>\$ 100,296</u>

Common utility conduit ( under sidewalk ) 2200' @ \$400.00 per lin. ft.	<u>\$ 880,000</u>
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Transverse crossing	<u>\$ 20,000</u>
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TOTAL :	<u><u>\$3,173,000</u></u>
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Basis of Utility Cost Estimate

All utilities to be permanently relocated in dual sidewalk utility channels prior to station construction.

High pressure and low pressure mains are to be permanently re-located off Market Street.

Dual sewers to be located beneath basement level.



## UTILITY CORRIDOR

## P.G. &amp; E.

ELECTRICITY

GAS

STEAM

## DEPT. OF PUBLIC WORKS

AWS&amp;S

SEWERS (comb.)

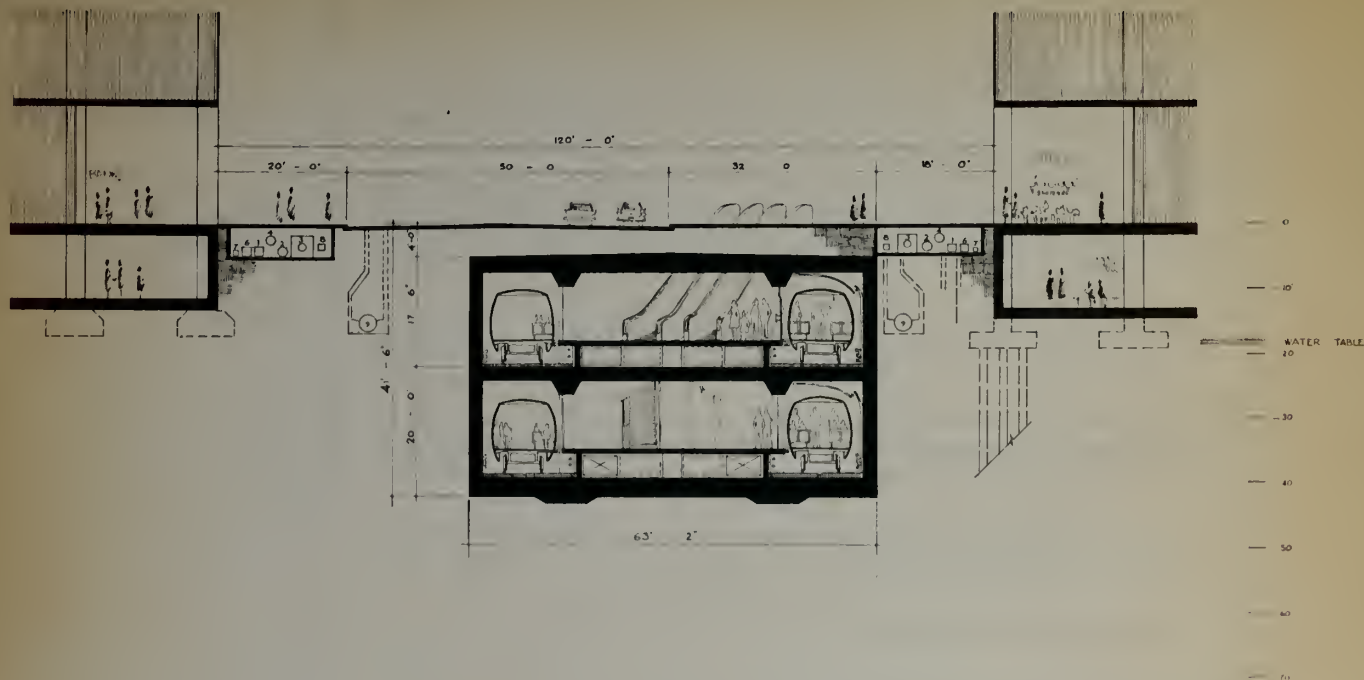
## DEPT. OF ELECTRICITY

## P. &amp; T.

## S.P. WATER DEPT.









Description. The utilities location proposed in Plan 5A is identical to that in Plans 4A and 4B. This plan represents a further exploration of the structural considerations identified with "cut and cover" construction.

In this plan, the mezzanine has been eliminated and a new concept of subway function is introduced. The surface of Market Street replaces the mezzanine as the collection and ticketing place for passengers. In order to maintain center loading platforms, the plan has become asymmetrical. The subway station and traffic way are off-center. This provides a widened sidewalk on the north side of the street to accommodate subway ticketing functions and allows access to the center platforms.

Feasibility. The utility configuration of this plan is identical to Plans 4A and 4B and is equally feasible.

Feasibility of subway system without mezzanines is beyond the scope of this report but has been used successfully in other cities and appears to have certain advantages and disadvantages.

Construction of this type of system is greatly simplified because of the shallow depth and reduced volume of construction.

Cost. Cost of utility work under this plan would be identical to Plans 4A and 4B.

Cost of the subway construction must again be discussed in terms of the entire street. Preliminary investigation indicates that considerable savings would accrue from the shallower depth and reduced volume of construction.

Construction Time. Because of the simplified configuration of this plan, the reduced volume of construction and shallow depth of construction, the time required for the work would be reduced by six to nine months over the three year schedule for Plan I.



Analysis. This plan extends the cost advantages of "cut and cover" construction introduced in Plan 4A. Underpinning of the buildings would be required on only one side of the street. The excavation along the entire street would be shallower and a reduced volume of construction would be required at station areas.

Utility advantages and disadvantages would be the same as Plans 4A and 4B except that north-south utility crossovers would have to go under the subway-- a serious problem at one or two points on the street.

Subway entrances on only one side of the street would be less accessible. But movement from street to train would be facilitated, and policing problems would be minimal.

Construction would entail extensive disruption of both street and sidewalk but would be concentrated in a shorter time period. Future flexibility on the street surface would be reduced by the unique location of subway entrances and the surface space required for ticketing.

In effect, the street surface becomes the mezzanine and would be the center of a greater concentration of activity.



P. G. & E. ( Electric )

1. Break out splice and transformer manhole	\$ 3,000
2. Building splicing and transformer manholes	167,900
3. Cable pull out and replacement	158,020
4. Switch gear and jumpers and relocate transformer gear	8,000
5. Customer service	103,120
6. Miscellaneous	<u>189,960</u>
TOTAL :	<u>\$ 630,000</u>

P. G. & E. ( Gas )

1. Longitudinal main: 2100' of 12" main @ \$20.00/ft.	\$ 42,000
2. Crossing at Montgomery Street: 300' of 16" main @ \$50.00/ft.	15,000
3. Crossing at 2nd Street: 350' of 12" main @ \$35.00/ft.	12,250
4. Intersecting tie-ins : ( 14 ) tie-ins	9,500
5. Temporary main and services :	8,000
6. Service transfers - replacements ( 18 ) services	<u>6,500</u>
TOTAL :	<u>\$ 93,250</u>





## PLAN 5A ( Cont'd )

P. G. & E. ( Steam )

1. Longitudinal main	\$ 47,100
2. Crossing at Anne Street	11,700
3. Manholes	10,000
4. Services	1,500
5. Support at Sutter Street	<u>13,000</u>
TOTAL :	<u>\$ 83,300</u>

Department of Electricity

## Police and Fire Alarm System

1. New ducts and cable system	\$ 81,447
2. Relocation of entry and exit points	21,382
3. Engineering design and contingencies	<u>10,283</u>
TOTAL :	<u>\$ 113,112</u>

Department of Electricity

## Traffic signal

1. Adjustments to system	<u>\$ 12,900</u>
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Department of Public Works

## AWSS

1. Hydrant assemblies	\$ 25,000
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PLAN 5A ( Cont'd )

98

2. Valves and vaults	\$ 59,000
3. AWSS pipe	368,000
4. Miscellaneous	60,000
5. Traffic routing ( temporary bridging )	<u>88,000</u>
TOTAL :	<u>\$ 600,000</u>

Combination Sewer

1. Remove brick sewer and replace with 2-24" reinforced concrete pipe and support in place: 2000' @ \$85.00 lin. ft.	<u>\$ 170,000</u>
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S. F. Water Department

22" line relocated off Market Street

1. Install 8500 lin.ft. 22" line @ \$42.00 per lin. ft.	\$ 357,000
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4. 12 connections @ \$1,000 each	12,000
5. Engineering and miscellaneous	<u>78,300</u>
TOTAL :	<u>\$ 581,700</u>
(for four stations)	
Charged against one station:	<u>\$ 145,425</u>



P. T. & T.

1. Support of ducts	\$ 125,000
2. Trunk crossing	125,000
3. Cable	<u>75,000</u>
TOTAL :	<u>\$ 325,000</u>

Western Union

1. Labor and overhead	\$ 31,543
2. Materials	30,843
3. Conduits and manholes	<u>37,910</u>
TOTAL :	<u>\$ 100,296</u>

Common utility conduit ( under sidewalk) 2200' @ \$400.00 per lin. ft.	<u>\$ 880,000</u>
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Transverse crossing	<u>\$ 20,000</u>
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TOTAL:	<u><u>\$3,173,000</u></u>
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Basis of Utility Cost Estimate

All utilities to be permanently relocated in dual sidewalk channels prior to station construction.

High pressure and low pressure mains are to be permanently re-located off Market Street.

Dual sewers to be located beneath basement level.





UTILITY CORRIDOR



P.G. & E.

ELECTRICITY



GAS



STEAM



DEPT. OF PUBLIC WORKS

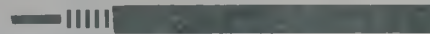
AWSS



SEWERS (comb.)



DEPT. OF ELECTRICITY



P.T. & T.



S.F. WATER DEPT.



WESTERN UNION



TIME:

0 2 4 6 8 10 12 14 16 18  
MONTHS

Legend:

DESIGN



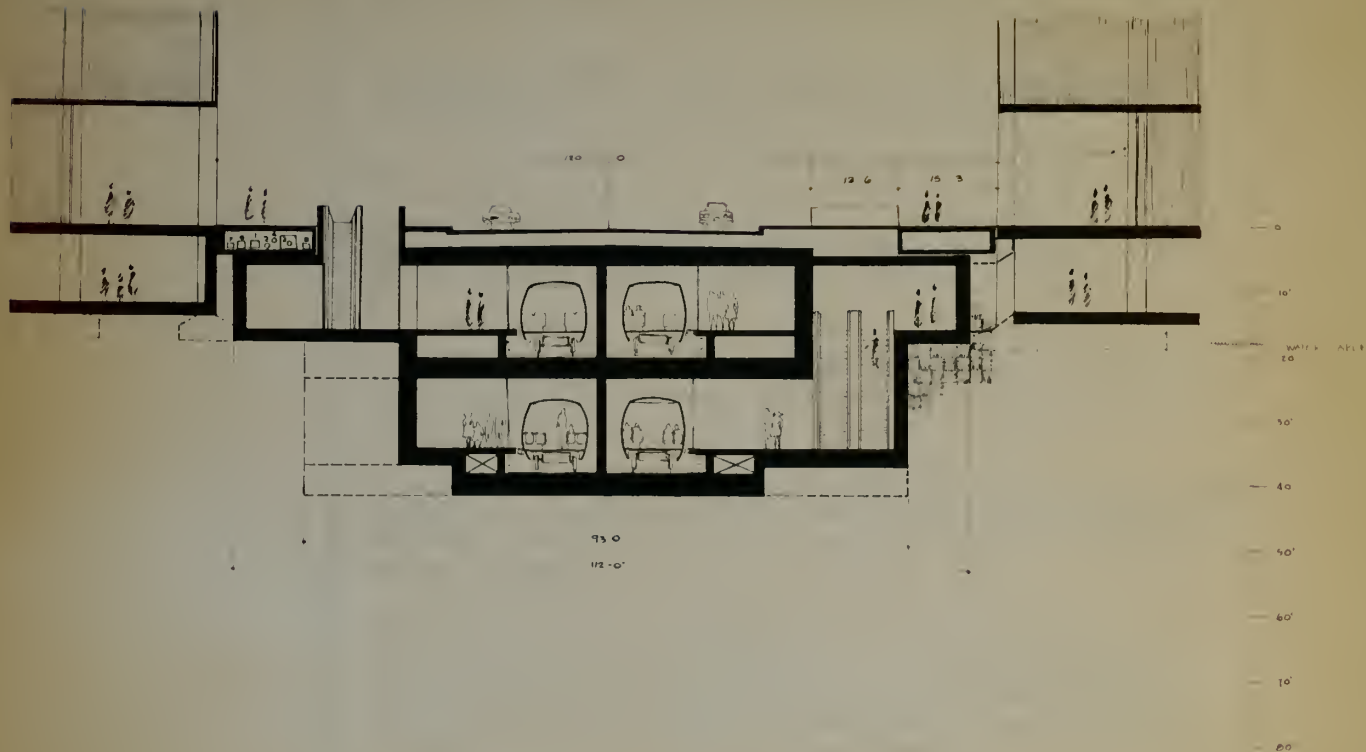
CONTRACT



CONSTRUCTION









Description. This plan is similar to Plan 5A except that side loading platforms are included. The subway is in the center of the street and the total depth of construction is 41'-6". No underpinning is anticipated on either side of the street.

Utility systems under this plan are identical to Plans 4A, 4B and 5A.

Feasibility. Utility systems and construction methods suggested by this plan are very similar to Plan 5A and are both feasible.

Cost. Cost of utility work under this plan would be identical to Plans 4A, 4B and 5A.

Construction of the subway is further simplified, and cost of the system would be correspondingly reduced.

Construction Time. As the construction procedure would be very similar to Plan 5A, the same six to nine month-time saving can be expected.

Analysis. In this plan, the side loading platforms place the subway tracks closer together and allow a minimal excavation between the stations. This system is thus the cheapest possible configuration for the subway.

Greater flexibility of connections to surrounding activities is obtained by the side loading platforms, but a serious problem of transfers from the BART to MUNI systems is introduced. A change of direction between these two systems requires that the passenger go to the street surface to crossover.



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3. Crossing at 2nd Street: 350' of 12" main @ \$35.00/ft.	12,250
4. Intersecting tie-ins ( 14 ) tie-ins	9,500
5. Temporary main and service	8,000
6. Service transfers - replacements ( 18 ) services	<u>6,500</u>
TOTAL :	<u>\$ 93,250</u>





## PLAN 5B ( Cont'd )

2. Valves and vaults	\$ 59,000
3. AWSS pipe	368,000
4. Miscellaneous	60,000
5. Traffic routing ( temporary bridging )	<u>88,000</u>
TOTAL :	<u>\$ 600,000</u>

## Combination Sewers

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TOTAL :	<u>\$ 581,700</u>

(for four stations)

Charged against  
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P. T. & T.

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TOTAL :	<u>\$ 325,000</u>

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Common utility conduit ( under sidewalk ) 2200' @ \$400.00 per lin. ft.	<u>\$ 880,000</u>
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Transverse crossing	<u>\$ 20,000</u>
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TOTAL :	<u><u>\$3,173,000</u></u>
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Basis of Utility Cost Estimate

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Dual sewers to be located beneath basement level.



UTILITY CORRIDOR



P.G. &amp; E.

ELECTRICITY



GAS



STEAM



DEPT. OF PUBLIC WORKS

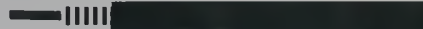
AWSS



SEWERS (comb.)



DEPT. OF ELECTRICITY



P.T. &amp; T.



S.F. WATER DEPT.



WESTERN UNION



TIME:

0

2

4

6

8

10

12

14

16

18

MONTHS

Legend:

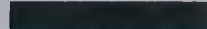
DESIGN



CONTRACT



CONSTRUCTION







## APPENDIX



## LIST OF APPENDIX ITEMS

- A Declaring official Policies of the Board of Supervisors regarding the Future of Market Street.
- B Letter from Mr. James Browne of BARTD.
- C Memorandum from Board of Supervisors.
- D Letter from Mayor Shelley to Mr. Adrian Falk of BARTD.
- E Letter from Mr. Myron Tatarian to BARTD.
- F Statement of Mr. Adrian Falk.
- G Chart: Comparison of Critical Paths for Schemes 2 A and 4 A
- H Mayor Shelley's Statement to the Market Street Coordinating Committee.
- I Market Street Design Task Force Objectives.
- K Section from Public Utilities Code of the State of California concerning BARTD Recommendations.
- L Agreement between the City and County of San Francisco and BARTD.



Date Adopted - February 15, 1965

File No. 297-61

RESOLUTION NO. 88-65

DECLARING OFFICIAL POLICIES OF THE BOARD OF SUPERVISORS REGARDING THE FUTURE OF MARKET STREET.

WHEREAS, The Bay Area Rapid Transit District wishes to build its three-county transit system without delay; and

WHEREAS, The Bay Area Rapid Transit District has indicated its desire to cooperate fully with the City and County of San Francisco on construction of the Market Street subway; and

WHEREAS, Construction of the Market Street subway offers San Francisco the opportunity not only to build a transportation system but also to achieve a renaissance of Market Street as a truly great thoroughfare; and

WHEREAS, It has been stated by the Mayor that it is his avowed policy to do everything possible to use this period of reconstruction of Market Street to the end that we have a Market Street that is the most beautiful and functional thoroughfare in the world; and

WHEREAS, This Board of Supervisors, having heard many reports on planning efforts thus far for Market Street, now desires to declare its policies for the future of Market Street for the guidance of both city officials and the Bay Area Rapid Transit District; now, therefore, be it

RESOLVED, That the following be declared the official policies of the Board of Supervisors regarding the future of Market Street



1. Market Street should be redesigned so that it will emerge from the period of subway construction as not only one of the world's great shopping streets but also one of the world's most attractive.
2. To make the subway stations as attractive as possible, and to encourage their use, the station mezzanines or concourses should be built as short a distance under the street as possible, and every effort should be made to link such concourses with the existing basement floors of buildings along Market Street.
3. If placing the concourse levels of subway stations a short distance under the street requires relocating the utility lines, and if it is technically and financially feasible to place utilities either under sidewalks or in special utility compartments alongside or under the concourses, then plans to relocate the utilities should be prepared at once and carried out.
4. Since it is strongly conceivable that continued operation of Municipal Railway streetcars and trolley coaches during the period of Market Street subway construction will unduly complicate the cost, time and other factors of such construction, and it therefore appears advisable to examine and devise suitable alternative modes of transportation including the use of motor buses, turnabout stations and other expedients in order to minimize inconvenience to passengers and the public generally, the Public Utilities Commission is hereby urged to confer immediately with the District for the purpose of recommending and approving such an alternative or alternatives for temporary operation on behalf of the District.
5. If removal of the 22" low pressure water main to an area off Market Street would provide greater flexibility in the design of rapid transit station areas and environs along Market Street, it is hereby requested that the Public Utilities Commission consider the technical and financial feasibility of the relocation of said low pressure water main.





6. If the removal of the high pressure water main of the Fire Department system to an area off Market Street would provide greater flexibility in the design of rapid transit station areas and environs along Market Street, it is hereby requested that the Chief Administrative Officer, in conjunction with the Fire Commission, consider the technical and financial feasibility of the relocation of said high pressure water main.

7. If the overhead wires on Market Street that are used both by streetcars and trolley coaches interfere with subway construction, or with the desirable appearance of Market Street after construction, then the Public Utilities Commission is requested to give consideration to elimination of overhead wires in their final planning.

8. All planning for the downtown area, including new parking facilities, extensions of north-south streets across Market Street, and plans for plazas and new buildings in connection with subway stations, should be fully coordinated with planning for Market Street, and thus with the work of the Market Street Task Force; and, be it

FURTHER RESOLVED, That copies of this resolution be sent to the Mayor, to the Bay Area Rapid Transit District, to all city officials concerned with Market Street, and to private utilities with lines under Market Street, for their guidance; and, be it

FURTHER RESOLVED, That this resolution, and subsequent resolutions to be adopted by this board as necessary, will constitute the official policy of the City and County of San Francisco with regard to Market Street Subway construction.



March 1, 1965

Planning and Development Committee  
Board of Supervisors  
City and County of San Francisco  
City Hall  
San Francisco, California 94102

Attn: Robert J. Dolan, Chief Clerk

Dear Sirs:

On February 9, the Planning and Development Committee transmitted ten questions dealing with utility relocations on Market Street. Members also asked for answers to an earlier inquiry by Mr. Myron Tatarian, Director of Public Works. Comparison of the two lists of questions shows that the Committee's concerns incorporate Mr. Tatarian's.

The Board of Supervisors subsequently passed a resolution declaring certain Market Street design policies. The resolution pointed out the desirability of spacious mezzanines at as shallow a level as possible. Before evaluating problems of cost estimates on Market Street, Committee members should be aware of a problem implicit in designing underground subway mezzanine and access structures. This paradox is that, generally speaking, shallow utility layers and spaciousness of the kind sought by the Board of Supervisors are not wholly compatible. More specifically, mezzanine space relatively free of support columns and offering expansive headroom implies a relatively deep mezzanine.

The Board resolution was approved at about the same time as the most recent joint meeting of the Mayor's Market Street Advisory Board and Executive Committee, before which BARTD presented its views on three alternative utility treatments: the District's "Basic



Scheme," and "Alternative One and an "Alternative Two." Cost estimates of the two alternatives were geared to relative differentials with respect to the Basic Scheme.

A technical, engineering estimate of precise utility handling costs involved in any of the three schemes is categorically impossible. An attempt to produce a valid, technically sound estimate would be futile inasmuch as a defensible engineering estimate of a project of this complexity must be based on precise designs and under rigid, objective circumstances. Even the District's "Basic Schemes," with a utility layer of 12 feet at control points, cannot be translated into design without thousands of man-hours and months of time. Engineering must advance to the point where detailed investigation of the soils, structures and utility configuration permit preparation of detailed cost estimates. Some problems would ordinarily be resolved at the option of the ultimate contractors, including the matter of soil removal cited in the tenth question of the Committee.

Any estimates or plan at this time must therefore depend solely on assumptions regarding design and construction work. Even then, cost estimates must remain expressed in relative, not absolute terms. The attached table indicates the approximate cost difference between the "Basic Scheme" and "Alternative One." It incorporates all the reliable detail available at this time for the Montgomery Street, Powell Street and Civic Center stations. It represents the only meaningful response to Committee questions numbered one through six.

Questions seven, eight and nine relate to streetcar operations and overhead wires on Market Street. The 1962 agreement between City and District spells out basic mutual obligations involved in Municipal Railway matters. The attached table refers only to underground and overhead plans, and not to the problem of streetcar operations. Maintenance of operations would most certainly complicate construction procedures, but may not necessarily add significantly to the total cost. Structural support of the street and sidewalk must provide





for truck loadings that are more critical than streetcar loadings. Existence of overhead power lines and guy wires would introduce complicating factors into operations of heavy construction equipment.

As to question ten, and the option of contractors on soil removal, contractors will probably use a variety of methods, depending on the economics of each particular project. Hoists, ramps, cranes and other techniques are cited as alternative methods. This diversity in methods would also apply to the delivery of construction materials to the site.

Sincerely yours,

/s/ James Browne  
Community Relations Officer

JB:IC  
Enclosure





CONSTRUCTION METHODS AND COST DATA  
 MARKET STREET REGIONAL RAPID TRANSIT STATIONS  
 (All amounts in thousands of dollars)

ITEM OF COST	MONTGOMERY ST. STATION		POWELL ST. STATION		CIVIC CENTER STATION		TOTAL
	<u>Basic Scheme*</u>	<u>Alt. I**</u>	<u>Basic Scheme*</u>	<u>Alt. I**</u>	<u>Basic Scheme*</u>	<u>Alt. I**</u>	
Utilities Relocated	Base	+ 260	Base	+ 410	Base	+ 320	+ 990
Utilities Supported	Base	+ 30	Base	+ 100	Base	+ 80	+ 210
Construction, in- cluding Excavation, Backfill & Tempo- rary Surfacing	Base	- 400		- 400		- 400	- 1200

\* 12-foot utility layer at control points

\*\* 6-foot utility layer at control points

S. F. B. A. R. T. D.  
 2/26/65 j. b.



DATE: February 9, 1965

MEMORANDUM FROM: Board of Supervisors, City and County of  
San Francisco

TO: Mr. James Browne, Bay Area Rapid Transit District

SUBJECT: Committee Report on Resolution Declaring Official  
Policies of the Board of Supervisors Regarding the  
Future of Market Street

In order that the Planning and Development Committee of the Board of Supervisors may give full consideration to all aspects of the development of the rapid transit system under Market Street and the street surface itself, we would be most grateful if you could provide the Committee the following information:

1. A station by station estimate of the cost of relocating, either temporarily or permanently, the utilities, as made necessary by the construction of the rapid transit stations--the cost to be given per station and for each utility.
2. Estimated cost, given per station and for each utility, of supporting each utility remaining in place during the construction period.
3. Estimated difference in cost per station of excavation for station construction where existing utilities are supported in place, as against excavation costs if these utilities had been relocated out of the excavation area prior to the start of construction.
4. An estimate of the savings in costs of station construction which could be realized by raising the level of the stations to a point where tunneling between stations is still feasible, while maintaining the station level at the shallowest practical depth.



February 9, 1965

Page 2

C-2

Note: This would include savings made possible through the elimination of extra depth; i.e., such as those on concrete work, etc.

5. The anticipated cost of backfill and compaction needed to give permanent support to these utilities which remain in place.
6. Estimated cost of temporary surfacing at each station area.
7. Description of the complexities involved, and of the estimated cost, of supporting the streetcar tracks in place during the construction period.
8. The possibilities of BARTD being able to finance alternate means of transportation should the streetcar tracks not be maintained in place.
9. Description of the possible effects of retaining the overhead wires in place during the construction period.
10. Description of the methods to be used for removing soil from the excavation, and bringing materials to the station sites for construction period.



February 10, 1965

Adrien J. Falk  
Bay Area Rapid Transit District  
814 Mission Street  
San Francisco, California

Dear Mr. Falk:

I would like to request that the Bay Area Rapid Transit District explore fully any proposals of our Board of Supervisors, and the Task Force, Executive Committee and Advisory Board of the Market Street Project.

It would seem very important that the advantages and disadvantages of all serious alternatives be documented carefully. Whenever possible these should be translated into dollar terms.

Of course any study of alternatives would include their effect on BARTD construction schedules. Quite possibly there are alternatives which could be built faster, though they necessitated a later starting date.

I am sure you agree that everyone involved in Market Street planning must be kept fully informed at all times. Neither side should withhold information from the other for any reason.

I do know the BARTD staff will give a thorough and objective examination of the questions asked by the Supervisors, city officers, agencies or committees.

With every best wish for the achievement of a system which serves the best interests of the Region and the City, I remain

Sincerely yours,

/s/ John F. Shelley  
Mayor





December 30, 1964

Bay Area Rapid Transit District  
814 Mission Street  
San Francisco, California 94103

Gentlemen:

The Market Street Design Task Force is now in the process of making detailed studies pertinent to the development of Market Street's future and the complete integration of rapid transit facilities with the structure of the Street. To assist us in this work, we have need of the following information for each of the rapid transit stations on Market Street between the Embarcadero and the Central Freeway:

1. Cost of supporting and maintaining utilities that need not be moved due to construction.
2. Cost of moving and maintaining utilities that must be moved to permit construction.
3. Cost of restoring "supported" utilities to permanent service.
4. Cost of restoring "temporarily moved" utilities to permanent service.
5. Saving in cost of station construction, exclusive of 1, 2, and 3 costs, if there were no utilities to contend with.

We would very much appreciate receiving this information at your earliest convenience, and take this opportunity of expressing our thanks for your full cooperation in the work of the Market Street Design Task Force.

Very truly yours,

S. M. Tatarian



STATEMENT OF ADRIAN J. FALK, PRESIDENT, BARTD  
BOARD OF DIRECTORS ON FINAL RAPID TRANSIT SYSTEM  
REFINEMENTS from RAPID TRANSIT, SEPTEMBER -  
DECEMBER, 1964

Our task is far from a simple one. It has been complicated by communities, organizations and individual citizens requesting refinements in the basic plan set forth in The Composite Report of May 1962, which formed the basis for the successful \$792 million bond election in November of that year.

It is the policy of this Board to approve feasible refinements in the system within the general framework of The Composite Report whenever there is pronounced demand therefore, provided such changes increase the system's effectiveness, appearance and comfort, benefit the communities and do not add materially to the system's cost. We are obligated to complete this system within the funds made available by the voters.

Requests involving protracted delay must also be weighed carefully. They can throw our time schedule out of kilter, thus adding substantially to the cost and delaying service to areas not directly affected by the change.

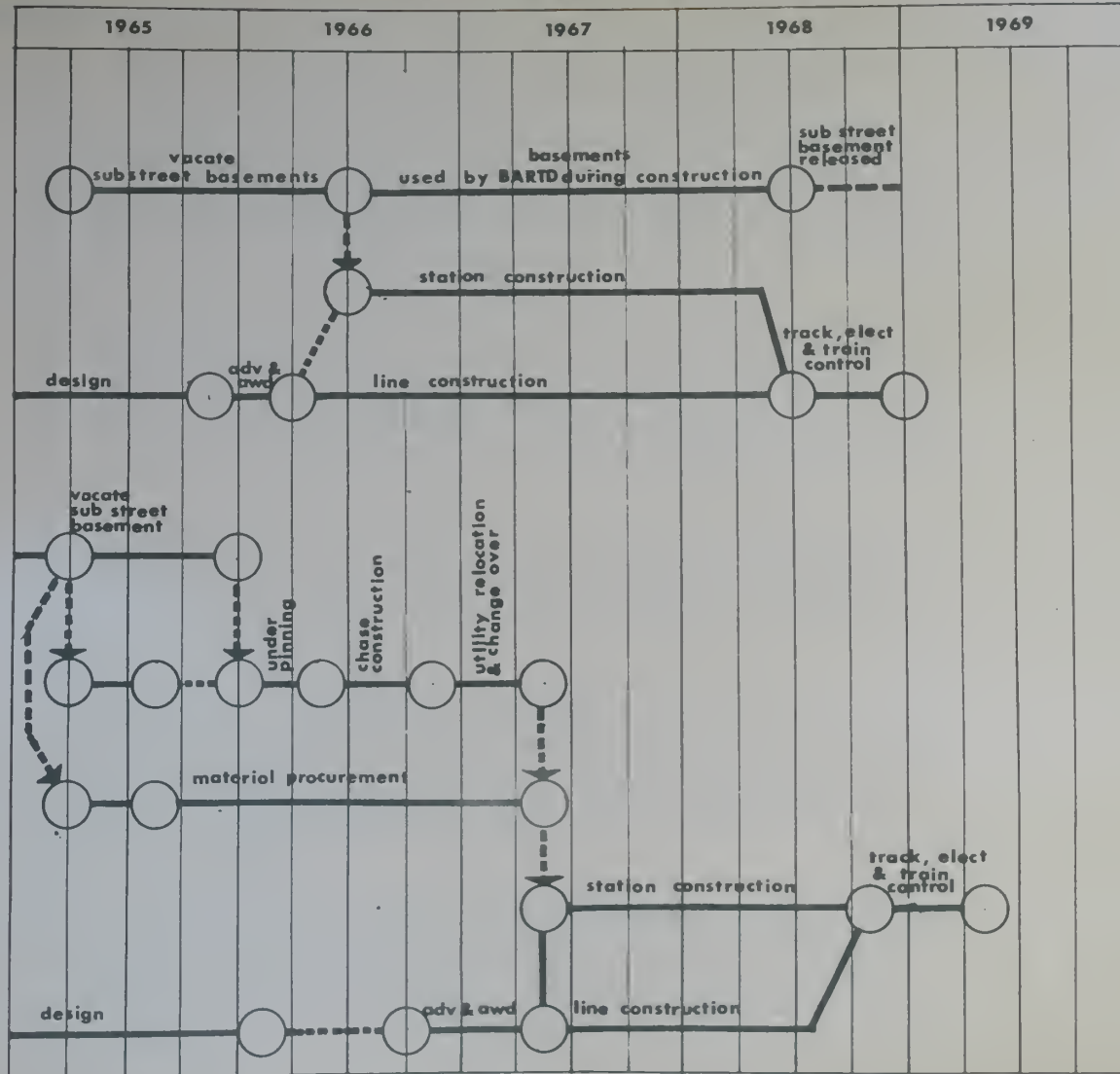
We are not indifferent to the wishes of any community or citizens but we must act as agents for the people of the entire District and give first consideration to its collective necessities.



## SCHEME 2 A

## SUB STREET BASEMENT

## LINE &amp; STATION





MAYOR SHELLEY'S STATEMENT TO THE MARKET STREET  
COORDINATING COMMITTEE, FRIDAY, JULY 10, 1964

I have carefully read the second report of the Technical Sub-Committee. The basic decision of the report is that subway entrances should be located within twenty-eight and a-half feet of the building line. This decision permits the transit district to go ahead with its design work. It also permits the city to put off a final decision on the surface design of Market Street.

The report also proposes a compromise treatment of the surface of Market Street. Municipal Railway buses will operate on two center lanes of the street. On either side of the transit lanes will be one lane for local automobile traffic. There will be pedestrian loading islands, much as at present. The sidewalks would be widened, at least near the subway entrances.

Everything below the surface will be part of the street car, train and station system. Proposals for an automobile or bus tunnel are rejected as unfeasible. In addition to the work of the Technical Sub-Committee a number of other studies will have a bearing on the design of Market Street.

These include a comprehensive, \$300 thousand study and plan of how to improve the Municipal Railway and coordinate it with rapid transit. I have already forwarded to the Board of Supervisors a request for \$120 thousand to begin this study. May I request that the Finance Committee and the Board approve this important element as soon as possible.

A companion measure to this will be a Downtown Traffic and Parking Study. I understand that Mr. S. Myron Tatarian, the Director of Public Works, is preparing a request of \$111 thousand of city funds to finance it. May I request that this be processed as soon as possible.





Both of these studies must be coordinated by the Mayor's Transportation Council. The federal government through the Housing and Home Finance Agency is expected to appropriate over \$250 thousand for a Rapid Transit Corridor Study. This will devise programs for the areas bordering on the rapid transit routes.

There are, of course, other major public contributions which will strengthen Market Street and its adjoining areas: the installation of the Bay Area Rapid Transit System, the Ferry Building Park or Embarcadero Plaza, the Golden Gateway and Yerba Buena Center Redevelopment projects.

I think I have mentioned all the pertinent studies and plans except one. That, of course, is the Downtown Plan unveiled almost a year ago. It was the creative effort of Mr. Mario Ciampi, City Planning Commission and its staff. Even the critics of the plan conceded that it is bold and dramatic. I gather it is too bold and too dramatic to be creatively handled by committee action.

Mr. Ciampi and the planners, like many others, conceive of Market as a pedestrian and public transportation street. There were others who wanted the Street turned over to automobiles. And the Municipal Railway sought exclusive lanes for buses.

The Technical Sub-Committee has skillfully compromised all these issues.

We will still have a little bit of Market Street for cars.

A little bit more sidewalk for pedestrians.

And nearly exclusive lanes for buses.

Or I can put it another way: We will have, it seems, just about the same old honky-tonk Market Street as now exists. All we have done is rearrange it a bit. I don't think this is what any of us had in mind



when we began this project. Somewhere we lost the spirit which prompted John McLaren to grow a Golden Gate Park from the sand dunes. The greatness which caused Daniel Burnham to conceive a majestic Civic Center. These men had courage and foresight and the boldness to dream of great beauty for our city.

Are we not willing to do as much? I think we are.

I think one principle has been pretty well established by the efforts of the Technical Sub-Committee so far. That is, design by committee does not work. Quite clearly we need one man designing the Street with the Technical Sub-Committee and the Market Street Advisory Committee serving as consultants to him.

A "Task Force" was established to work on the design. It was to be composed of representatives from the Department of Public Works, Department of City Planning and Municipal Railway. Unfortunately this "Task Force" has not been adequately staffed and has not been working full time. This should be changed and the "Task Force" should work full time with the designer. They should be together in one office which could be located on Market Street near the Civic Center.

Whatever the final plan for Market Street, many private decisions will have to be coordinated if we hope to have a truly magnificent main street--a street which will attract shoppers and offices from the suburbs.

Decisions regarding private actions need not wait until the public decisions are made. The Market Street Development Project should be coordinating the improvement of private property. Assisting should be organizations such as SPUR, the Down Town Association, the Chamber of Commerce, Retail Dry Goods Association, and all the property owners and lessees on the Street.



There are lots of questions I would like to ask today. I hope you can give me answers to some before we adjourn, because I think they are important to the future of the City. I will read all the questions before seeking answers. (1) Why cannot we have a great Market Street, a magnificent place as beautiful as our hills and our bay, a place people will come from all over the world to see? Is Mario Ciampi's plan wrong and if so is there no other solution but the same old street? (2) Right now is the time to decide whether there should be automobiles on Market Street. What is wrong with keeping automobiles off Market Street? Should not San Francisco be a leader in turning a significant part of its downtown back to the pedestrian--the shopper and office user. Would this not encourage the use of public transportation in areas which can never work well with heavy traffic? The Municipal Railway Study should consider all conceivable means of public transportation. Decisions can be--and must be--made about these questions whether or not the beforementioned studies are conducted. (3) Some of the funds for the Rapid Transit Corridor Study must be used for redesigning Market Street. Rather than use City funds to employ a designer, cannot Mr. Herman and Mr. McCarthy agree to use HHFA funds for this purpose? I understand that BARTD is considering assigning an architect to the Market Street station areas. I urge you BARTD representatives to precipitate this decision and dedicate as much talent and money as is needed to help design the surface as well as the subway. (4) SPUR and the Market Street Development Project have discussed providing office space near the Civic Center for the "Task Force," designer and committee meetings. Can you proceed with that immediately? (5) The Technical Sub-Committee has recommended a Pedestrian Movement Study. This is a task that could be coordinated by the Market Street Development Project with the technical guidance of city departments. The study is estimated to cost \$15 thousand. Will the private owners and lessees undertake this study as part of their contribution? (6) How much expenditure is being planned by private owners and lessees to rejuvenate their premises? Are these planned expenditures being coordinated to enhance the whole Street as well as the individual properties? Again, the





Market Street Development Project is in the best position to pull the forces together. (7) How many properties will tie into the mezzanine level of the subway stations? Is the Market Street Development Project coordinating with the transit district and city departments on this matter?

I ask that, by next Friday, reports be submitted to me by Mr. McCarthy regarding proceeding with the public aspects of this program, and by Mr. McLindon regarding the private property aspects.





MARKET STREET DESIGN TASK FORCE  
1254 Market Street, Room 303  
San Francisco, California KL 8-3549

September 15, 1964

Market Street - Design Objectives

1. To revitalize the Street so that it may once again become the major business street and the most prestigious address in San Francisco.
2. To accomplish this work within the framework of the existing stable and fixed elements, while fulfilling the objective of achieving diverse functional groupings appropriate for the Street and integrated with the many functions of the downtown area as a coordinated whole.
3. To develop buildings and building complexes which reflect their purpose and function in the entire structure of the Street at densities, heights, locations, and environmental settings conducive to the public well being.
4. To develop buildings and building complexes which can absorb, to the greatest possible extent, changes in internal and external operations which may occur during the period of their useful life expectancy.
5. To achieve the full realization of the visual potential inherent in the site in terms of natural features, architectural landmarks, precinct areas, spaces, etc.
6. To fully integrate into the structure and function of the Street a regional rapid transit system which, by the nature of its scheduling,



comfort, convenience, efficiency, attractiveness, safety, and fare structure, will provide a very desirable alternative to the motor car as a means of transportation.

7. To develop the Muni Railway Subway System so that within its selected area it will handle the greatest possible volume of all local mass transit riders with comfort, convenience and safety--and so that it will provide necessary and desirable ways of distributing and collecting passengers.

8. To provide convenient and attractive areas for diverse pedestrian movements and activities, which recognize the major travel desire lines, and reduce to a minimum conflicts with cross pedestrian traffic and with vehicular traffic.

9. To provide adequate and properly located access and egress points from arterial and major highways into and from the downtown area and a direct and free circulation of necessary vehicular traffic within the downtown area.

10. To provide for adequate storage of vehicles in locations which will minimize the amount of travel on downtown streets, yet allowing for convenient access to the major centers and subcenters of the downtown area.

11. To provide for good servicing of buildings and businesses with the absolute minimum of interference to the other uses of the Street.

12. To provide a utilities system to serve all the needs of the Street, which, by the nature of its construction, can be fully maintained at all times and be replaced, altered or expanded as may be required, with the absolute minimum of conflict, interference, or inconvenience to other uses of the Street.

13. To produce a Street which is capable of easy and effective policing, cleaning and maintenance.



14. To produce an environment in which the type and degree of noise is balanced to produce pleasant conditions for the activities dominant within the several diverse areas of the Street.
15. To produce an environment which reflects the desirable sociological structure of the community now, and in the future.
16. To produce developments which will secure the economic viability of the area as a whole, as well as the diverse interests of individual enterprises within its boundaries.
17. To accomplish these objectives within a reasonable schedule of phasing and implementation, which is to include funding.



SECTION FROM PUBLIC UTILITIES CODE OF THE STATE OF  
CALIFORNIA CONCERNING BARTD RECOMMENDATIONS

Section 29036. Referring recommendations for routes, etc., to city, etc., concerned. The board of directors shall refer for recommendation the plans of routes, rights of way, terminals, stations, yards and related facilities and improvements to the city councils and board of supervisors within whose jurisdiction said facilities and improvements lie and to such other state, regional and local agencies and commissions as may be deemed appropriate by the board of directors. The board of directors shall give due consideration to all recommendations submitted.





AGREEMENT BETWEEN THE CITY AND COUNTY OF SAN FRANCISCO AND THE SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT RE RELOCATION OF MUNICIPAL RAILWAY AND OTHER FACILITIES FOR THE CONSTRUCTION BY THE DISTRICT OF PROPOSED RAPID TRANSIT SUBWAYS WITHIN THE CITY AND COUNTY OF SAN FRANCISCO

THIS AGREEMENT is entered into this 28th day of June, 1962, between the SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT, hereinafter designated "District," and the CITY AND COUNTY OF SAN FRANCISCO, hereinafter designated "City and County," for the purposes enumerated as follows:

1. WHEREAS, District is a public agency of the State of California charged with the responsibility by the Public Utilities Code, and pursuant to the terms thereof, of proposing, and upon approval, undertaking, the acquisition or construction of rapid transit facilities for the San Francisco Bay Area; and

2. WHEREAS, City is a municipal corporation chartered under the Constitution of the State of California and is governed pursuant to the provisions of its said Charter; and

3. WHEREAS, District has on the 24th day of May, 1962, determined and declared by Resolution that a proposed rapid transit plan for the construction of rapid transit facilities in the Counties of San Francisco, Alameda, and Contra Costa is feasible and necessary pursuant to its review of certain reports of engineers, economists, fiscal experts and others; and

4. WHEREAS, District has determined that \$792,000,000 worth of general obligation bonds should be issued in order to construct the said rapid transit facilities in the said Counties of San



Francisco, Alameda, and Contra Costa; and

5. WHEREAS, District has on the 24th day of May, 1962, referred said reports of engineers, economists, fiscal experts and others to the Board of Supervisors of City and County for its approval and has also referred said reports to the Boards of Supervisors of the Counties of Alameda and Contra Costa in like fashion; and

6. WHEREAS, the plans thus submitted by District for construction of rapid transit facilities in the said three counties provide for the construction of certain rapid transit subways within the County of San Francisco as described therein; and

7. WHEREAS, there has arisen a need for the definition and statement of the rights and obligations of District and of City and County with respect to construction of the above-described subways particularly as concerns the question of the removal, reconstruction or relocation of facilities of the City and County required by said construction, and further, as concerns payment of additional costs occasioned by providing substituted temporary facilities for use by City and County during periods when necessitated by construction operations; and

8. WHEREAS, it is the intention of District and City and County that City and County exercise hereby its powers under Section 29037 of the Public Utilities Code (San Francisco Bay Area Rapid Transit District Act, Stats. 1957, Ch. 1056, Sec. 3, p. 2309) whereby the City and County may consent to interference with or the exercise of control over transit facilities which are owned and operated by it within the territory of District; i. e., Municipal Railway of City and County; and whereas, District and City and County further intend that the terms of this agreement be mutually agreed upon between District acting through its Board of Directors and City and County for the purpose of effectuating the provisions of said Section 29037; and whereas, District and City and County further



intend to act herein pursuant to the Joint Exercise of Powers Act (Ch. 5, Title 1, Div. 7, California Govt. Code); and

9. WHEREAS, it is the intention of District and City that District further exercises hereby, without limiting the scope or applicability of any of its other powers, its contractual powers pursuant to the provisions of Public Utilities Code Sections 28970 and 28971 (Stats. 1957, Ch. 1056, Sec. 3, p. 2307), and District hereby finds that entering the terms of this agreement is an act necessary and convenient for the full exercise of the powers granted to District, and contracting upon said terms has been found by the Board of Directors of District to be in the best interests of District; and

10. WHEREAS, it is the further mutual intention of District and City that this agreement shall become operative upon the approval of general obligation bonds of the District authorizing construction of the Rapid Transit Project hereinbefore described at a special bond election conducted for said purpose pursuant to the provisions of the San Francisco Bay Area Rapid Transit District Act;

NOW, THEREFORE, in consideration of mutual promises and the foregoing stated considerations the parties hereby do mutually agree as follows:

1) City and County hereby consents to the interference with and exercise of control over transit facilities of the Municipal Railway of San Francisco pursuant to the following terms and to the extent hereinafter permitted under this agreement for the purpose of allowing construction of projected subways for the use of trains of District and of streetcars of the Municipal Railway of City and further, including single-decked subways for the use, respectively, of trains of District or of streetcars of the Municipal Railway of City.

2) Nothing in this agreement shall make City an agent of, or a partner or co-venturer with District in the construction of the





said described subways, and it is understood and agreed that City shall have no responsibility for nor control over said construction or the time, method or manner thereof, except to the extent provided by law and in so far as this agreement shall provide certain obligations binding on District with respect thereto.

3) District shall pay the cost, exclusive of betterment and with credit for salvage value, of removal, reconstruction or relocation of any and all City and County facilities required in connection with the construction of said subways. For the purpose of this agreement, any construction of said subways shall be deemed to have been undertaken pursuant to exercise of the power of eminent domain; provided, however, that this agreement shall not affect the rights or obligations of District or City and County with respect to other construction of rapid transit facilities by the District not in connection with the construction of the said subways. This section shall be interpreted as hereinafter provided in subsequent provisions of this agreement.

4) For the purpose of this agreement, "facilities" shall include all streets, roads, highways, sewers, drains, water mains and pipes, tracks, poles, supporting structures, and all other street-car or trolley coach apparatus, high pressure lines, vaults, ducts, conduits, wires, cables, street lights and street lighting equipment, traffic signals and related equipment, apparatus used for police or fire communications, or any other type of structures or improvements not limited to the foregoing, of City and County acting in a governmental or in a proprietary capacity or any other public structures or public improvements, and any and all appurtenances thereto, and shall include without limiting the generality of the foregoing, all facilities of the Municipal Railway, the Water Department, the Bureau of Light, Heat and Power, the Public Works Department, the Fire Department, the Police Department, the Department of Electricity, of the City and County, and every other agency of City and County and every other public agency.





5) For the purpose of this agreement, "cost" shall include all administrative, personnel, labor, engineering, inspection, material, supply, and contract costs for both temporary and permanent construction, and all other expenses or charges of any kind whatever, arising out of the use of its own staff and employees, or out of the use of third parties, of City and County in connection with any removal, reconstruction or relocation of City and County facilities required in connection with the construction of said subways. Costs, expenses or charges arising out of the use of City and County's own staff and employees shall be determined, on the basis of a reasonable allocation.

6) In making any payment to City and County required under Section 3 of this agreement, no deduction shall be made by District by reason of any increased value of any facility which is substituted in place of any facility of City and County removed, reconstructed or relocated in connection with the construction of said subways; but if any betterments not required by District's plans are requested by City and County then any additional cost occasioned by the installation of such betterments shall be paid by City and County.

7) Any facilities, the removal, reconstruction or relocation of which is required pursuant to this agreement and which are not again subject to use by City and County by reason of changes effected by said removal, reconstruction or relocation shall be retained by City and County but a credit shall be awarded to District, as against its liability for costs pursuant to Section 3 or this agreement, of the salvage value, if any, of any such unused facilities.

8) If due to the performance of the work of subway construction, any facilities of the City and County, whether physically affected by such subway construction or not, are rendered unusable, obsolete or surplus by, or if usable are duplicated by, other facilities built in the course of such subway construction, such facilities shall



at the discretion of City be removed at the expense of District subject to a credit for any salvage value thereof, as provided in Section 7 of this agreement and District shall pay the cost of resurfacing street areas required by such removal of facilities to the same extent and in the same manner, with similar materials, and to the same standards applicable to adjacent street areas. Responsibility of District for costs of removal of, or resurfacing of street areas in connection with, any facilities of the City and County which are not located in the construction area shall be determined upon mutual agreement of District and of City and County. In the absence of such agreement, the responsibility of District, if any, shall be determined as provided by law.

9) District will pay to City any and all additional costs occasioned by providing substituted service for any operations or functions for the period or periods when same are interrupted during the construction of said subways, including but not limited to costs of construction, installation, operation and removal of any and all temporary facilities required for such purposes. Without limiting the generality of the foregoing, substituted transit service may be conducted by types of vehicles and over routes selected in the reasonable and prudent discretion of the Municipal Railway of City and County.

10) The terms and conditions of this agreement shall constitute contractual obligations of District and of City and County and shall not be deemed repealed, modified or otherwise abridged by any subsequent amendment to the San Francisco Bay Area Rapid Transit District Act.

11) This agreement is intended to control certain aspects of subway construction in the County of San Francisco and its failure to cover other portions of the Rapid Transit Project of District shall not affect rights or obligations between City and District as to such other portions or between District and any other public agency.



IN WITNESS WHEREOF, the parties hereto have executed  
this agreement as of the day and year first written above.

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

/s/ Adrien J. Falk  
President

Richard J. Shephard  
Secretary

APPROVED: John M. Peirce  
General Manager

Kenneth M. Hoover  
Chief Engineer

APPROVED AS TO FORM: Wallace L. Kaapcke  
General Counsel

CITY AND COUNTY OF SAN FRANCISCO

/s/ George Christopher  
Mayor

Robert J. Dolan  
Clerk of the Board of Supervisors



APPROVED: Sherman P. Duckel  
Chief Administrative Officer

PUBLIC UTILITIES COMMISSION

/s/ By Robert C. Kirkwood  
Manager of Utilities

APPROVED AS TO FORM: Thomas M. O'Connor  
City Attorney





BEFORE THE BOARD OF DIRECTORS OF THE  
SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

In the matter of authorizing agreement with the  
City and County of San Francisco concerning re-  
location of Municipal Railway and other facili-  
ties.

Resolution No. 226

WHEREAS, the San Francisco Bay Area Rapid Transit Dis-  
trict desires to enter into an agreement between the City and County  
of San Francisco and the San Francisco Bay Area Rapid Transit  
District re relocation of Municipal Railway and other facilities for  
construction by the District of proposed rapid transit subways within  
the City and County of San Francisco, which agreement is attached  
hereto, marked "Exhibit A" and incorporated as though set forth at  
length herein,

NOW, THEREFORE, BE IT RESOLVED that the board of di-  
rectors of the San Francisco Bay Area Rapid Transit District does  
hereby authorize the "Agreement between the City and County of San  
Francisco and the San Francisco Bay Area Rapid Transit District re  
Relocation of Municipal Railway and Other Facilities for the Con-  
struction by the District of Proposed Rapid Transit Subways within  
the City and County of San Francisco" in the form of the attached Ex-  
hibit A, and

BE IT FURTHER RESOLVED that the President of the board  
of directors and the Secretary of the District be and are hereby au-  
thorized, empowered and directed to execute said agreement for and  
on behalf of the District.

# # #

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Certified a true copy.

/s/ Richard J. Shephard, Secretary



## Resolution No. 226

The foregoing resolution was made at the motion of Director  
Swan , seconded by Director Dolan ,  
and adopted by the following vote of the Board:

AYES: 7 - Directors Anderson, Charles, Cummings, Dolan,  
Morrison, Swan and Falk.

NOS: 2 - Directors Joseph and Silliman.

ABSENT: 2 - Directors Gray and MacLeod.

ABSTAIN:

I do hereby certify that the foregoing resolution was duly and  
regularly introduced, passed and adopted by the Board of Directors  
of the San Francisco Bay Area Rapid Transit District at a regular  
meeting held on the 28th day of June, 1962.

/s/ Adrien J. Falk  
Adrien J. Falk, President

Richard J. Shephard  
Richard J. Shephard, Secretary

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT  
Certified true copy.

/s/ Richard J. Shephard  
Secretary









## MARKET STREET DESIGN REPORT

MARIO J. CIAMPI & ASSOCIATES, ARCHITECTS & URBAN CONSULTANTS

JOHN CARL WARNECKE & ASSOCIATES, ARCHITECTS & PLANNING CONSULTANTS